Sustainability Efforts in New Zealand's Cheese Industry

A thesis submitted in partial fulfilment of the requirements for the

Degree of Master of Commerce

in the University of Canterbury

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University of Canterbury

2016

Preface & Acknowledgments

I would first like to thank my thesis supervisor Dr Pavel Castka for his support throughout my research and writing process.

I would also like to thank the all interview participants and mediators that helped me to connect with the industry experts. Without their passionate participation and input, my thesis could not have been successfully conducted.

Finally, I must express my very deep gratitude to my parents and my brother for providing me with constant support and continuous encouragement throughout my years of study. This accomplishment would not have been possible without them.

Thank you.

Fabian Kullmann

Abstract with Keywords

The recent scandals of New Zealand's dairy industry have implications for the cheese industry. As consumer awareness about the sustainability of food production is on the rise, businesses have an obligation to respond. Sustainability is a holistic concept that combines environmental protection, social responsibility but also the economic success, and does not only concern a single company but the whole supply chain. Therefore, the cheese supply chain of New Zealand is the focus of this research as a growing industry that contributes significantly to New Zealand's economy. A holistic consideration of the sustainability efforts of this particular supply chain has not yet been researched. This exploratory case study aims to identify the sustainability efforts within the cheese supply chain and compare practices with Elkington's triple bottom line (1997), with consideration of sustainable supply chain management theories. The research approach integrated seven companies that were milk suppliers, cheese manufactures and distributors in New Zealand to provide a holistic summary of the practices and circumstances. Overall various practices for the enhancement of sustainability were identified and matched with the named theories, which demonstrated a lack of practicality through unrealistic assumptions. The case study allows practitioners in the cheese supply chain to compare their practices, while the findings aim to enhance the sustainability of their business. In addition, differences between the practical and academic world are acknowledged, which can be used to further improve the research about sustainability.

Keywords: Sustainability, Sustainable Supply Chain Management, Cheese, New Zealand, Artisan Cheese, triple bottom line

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1. Introduction

The United Nation Climate Change Conference 2015 in Paris has increased the awareness of climate change and concluded that business models will alter on the long-term. As a result of that businesses need to integrate sustainable strategies to utilize the commercial opportunities and challenges, while a delay in those in investments will only increases the related costs. The climate change should not be the only motivator for businesses as the marketing potential of sustainability also provides businesses with several opportunities to increase their profit and reputation (United Nations, 2015). De Bruin & Lewis (2005) criticized that business practices do not always represent this. The image of New Zealand is one of the main pillars of the economy; therefore it needs to be protected (Collins, Roper, Lawrence, 2010). The green image of New Zealand is often used for the advertising within NZ and abroad, particularly the culinary tourism industry can utilize the image of local foods for their advantage (Hall, Sharples, Mitchell, Macionis & Cambourne, 2004). New Zealand already adapted a sustainable development policy in 2003, which is emphasizing that "sustainable development must be the core of all government policy" (DPMC, 2003). This was reinforced in 2006 by the Prime Minister who stated that New Zealand "aims to be the first country which is truly sustainable" (Clark, 2006). But the 'Dirty Dairying' campaign in 2002 (TVNZ, 2002) and recent scandals about water pollution (New Zealand Herald, 2016) and animal welfare issues (Hall, 2016) raised the awareness of sustainability issues in the dairy supply chain and New Zealanders were worrying if it's still okay to have a slice of cheese with a glass of wine.

1.1. Problem Background

The growing economy of New Zealand was enabled by new technologies that allow businesses to grow and be more efficient, which increased the living standard of many people. But with the evolution on the business site, new practices were introduced to reduce costs and maximise outcomes (Siems, 2005). The primary industry in New Zealand evolved greatly in recent years Zealand and contributes to more than 50% of the export revenue. (Statistics NZ, 2015c). The small country on the other end of the world is known for its dairy products all over the world. The awareness of the public rose through various food scandals

all around the world, which lead to a debate around the "impact on public health of food production, processing and distribution" (Wognum, Bremmers, Trienekens, van der Vorst & Bloemhof, 2011, p. 65). The increased global consumption of cheese and dairy pose a threat towards both human and animal health, food security and the environment as the increased price and productivity pressure leads to an industrialization of the agricultural and food industry, which can cause a neglect of quality, social and environmental principles (Gerosa, Skoet, Muehlhoff, Bennett & McMahon, 2013). Not only claims for higher quality were made but also demands towards more sustainable products and practices in general. Various stakeholders, such as critical consumer groups, NGOs and governments requested more research around sustainability. Different associations published multiple sustainability advices and guidelines for the involved enterprises, which aim to push their sustainability efforts to preserve New Zealand's magnificent nature and society. The Ministry for the Environment [MFE] of New Zealand is aware of the situation that the country needs to make changes in their policies and behaviours to maintain the green and sustainable image in the world. The MFE sees the biggest issues of the dairy industry in their emissions, the contribution to the declining freshwater quality, as well as negatives impacts on biodiversity and ecosystems (Ministry for the Environment, 2015). The question arises: How did the dairy industry react to these statements and what efforts are actually introduced and implemented throughout the whole supply chain?

1.2. Problem

With the increase in numbers of studies regarding environmental change and sustainability issues, the business world has to react as the public opinion about this topic affects products and subsequently their production chain. Consumers are demanding more sustainable products, but other stakeholders such as governments, non-governmental organizations and their own employees are also playing an influential role (Seuring & Müller, 2008b). Resultantly organizations will need to explore opportunities that will enable them to supply more sustainable products, which affect the whole supply chain. Rossing, Zander, Josien, Groot, Meyer & Knierim (2007) stated that academics were able to create new knowledge and technologies for sustainability, but failed to make it usable and practical. The wine industry of New Zealand can be seen as a trendsetter in this field as they realised early that sustainability is an important topic for them and they are proactively working towards

more sustainability (NZ Wine, 2015). The scandals about bad dairying practices (New Zealand Herald, 2016; Hall, 2016) that pollute the environment and negatively affect animal welfare show that there are still issues with sustainability in the dairy industry. Cheese is one popular product that New Zealand also exports in large quantities and makes substantial contributions to New Zealand's economy (Statistics NZ, 2015b). Furthermore, artisan cheese is gaining popularity in supermarkets and on local farmers markets. But what are the differences between industrial and artisan cheese in terms of sustainability? The research of New Zealand's dairying industry mostly focuses on specialised topics that do not allow a holistic overview of efforts in the whole supply chain. The trend of the cheese production in New Zealand show that the industry is growing, both on industrial and artisan level (Statistics NZ, 2015b), which raises the question: What efforts are undertaken to support the sustainable development of New Zealand's cheese supply chain? The current research did not provide a satisfying answer to that question, while several studies to the dairy industry in New Zealand exist. The proposed research aims to explore the sustainability efforts in the cheese supply chain and give further insights that can be utilized by practitioners of the industry to compare and evaluate their own efforts with the findings. The findings can also diminish the current knowledge and can be used in upcoming research projects. In addition current theories around supply chain sustainability can be evaluated in comparison with the reality.

1.3. Aim and Research Questions

The aim of this case study is to critically evaluate the sustainability efforts of the cheese supply chain of New Zealand through the triple bottom line approach and compare those with the sustainable supply chain management theory to show potential improvement possibilities. Therefore, companies with a proactive approach towards sustainability have to be chosen to maximise the data. This research tries not to evaluate how sustainable cheese from New Zealand is because an answer can only be given to specific products for example through a life cycle analysis, but not to a general product category.

Research Objectives:

1. Analyse the sustainability efforts of the cheese supply chain through the triple bottom line.
2. Identify critical issues of the sustainability within the supply chain.
3. Compare the efforts with the sustainable supply chain management theory.
4. Evaluate the fit of the theory with current practices.

Research Questions:

1. What efforts are undertaken to enhance the sustainability of the cheese supply chain?
2. How do the explored efforts enhance the sustainability of the supply chain based on the triple bottom line?
3. How do these efforts fit the theoretical concept of sustainable supply chain management and how and why do they differentiate?
4. Where are improvement possibilities in theory and practice?

1.4. Outline

The research is structured in six chapters that also follow the research process. The first two chapters provide background information. The first chapter introduces the topic and the aim of the research including the research questions. After that, chapter two reviews relevant literature, introduces to the theories of sustainable supply chain management, which may apply to the research questions and a industry overview is provided. In the third chapter the methodology of this study is further explained, which includes the analysis and data collection methods. In chapter four the undertaken efforts are analysed and the first research question is answered. Chapter five matches the undertaken efforts with the relevant theories and discusses the findings to answer the last three research questions. It also includes implications, limitations and suggests future research opportunities. A conclusion of this study is given in chapter six.

2. Literature Review

This chapter introduces the relevant definitions and provides the reader with an overview of the relevant literature about sustainability and the triple bottom line, sustainable supply chain management and already applied sustainability efforts in the cheese supply chain. This is followed by an overview of the cheese making process and relevant industry information is given to broaden and deepen the understanding of the research.

2.1. Sustainability and the Triple Bottom Line

Environmental changes such as the rising sea level, increased temperatures as well as the ongoing pollution of both air and water and the depletion of other natural resources as a current and controversial point of ecological research. "The resulting changes will affect our ecosystem, by disrupting food and water supplies, submerging coastal wetland and causing severe weather patterns and species extinction" (Gupta & Palsule-Desai, 2011, p. 234.) Throughout the examined literature varying definitions of sustainability have been provided: One of the most cited definition is the one of the Brundtland Commission (Carter, Rogers, 2008; Binder, Schmid & Steinberger, 2012), which states that "using resources to meet the need of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p.8). This definitions recognizes the impact of economic activity to the environment in developing and industrialized economies and the need for sustainability to for the future humanity. This broader statement appeals to all stakeholders of companies, which also includes society, local communities and the environment. Most of the definitions contain considerations of environmental and social issues (Rogers, Carter, 2008). In the management research, Shrivastava (1995) defined sustainability as an opportunity and "the potential for reducing long-term risks associated with resource depletion, fluctuations in energy costs, product liabilities and pollution and waste management" (Shrivastava, 1995, p.955). Aiking and de Boer (2004) noted that "sustainability should not be understood as a requirement to maintain a static situation, but as a challenge to preserve the resilience and adaptability of the natural systems that from the basis of social and economic development" (p.360), which emphasizes that there is not only one correct solution, but different ways to approach it. A definition for corporate sustainability, which is accepted and used by most of the academics, has not been

implemented (Hahn, Figge, Pinkse & Preuss, 2010), while most of the literature reverts back to the Brundtland Commission's definition of sustainability.

Elkington (1997) introduced the concept of the triple bottom line (see Figure 1), which adapts to the definitions. It can be used to judge and classify firm actions and practices through the three bottom lines environmental protection, social responsibility and economic success to see how sustainable it is. While "the three bottom lines are interrelated, interdependent, and partly in conflict" (Jeurissen, 2000, p. 231), only the shear zone (overlapping zones), where all circles overlap is sustainable. This concept was further developed to a framework by Carters and Rogers (2008), which is reviewed in chapter 2.3.1.

Figure 1: The Triple Bottom Line of Elkington (1997)

2.1.1. Sustainability practices in the food supply chain

In this section sustainability management practices are portrayed that can apply to the cheese supply chain, while not all practices can be applied to all stages of the supply chain, which is "a network of connected and interdependent organisations mutually and co-operatively working together to control, manage and improve the flow of materials and information from suppliers to end users" (Christopher, 2005, p. 4). As the cheese supply

chain is the focus of this research, this broad definition does fit, but the more specific food supply chain definition of Folkerts & Koehorst (1997) provides a better fit: A food supply chain is "a set of interdependent companies that work closely together to manage the flow of goods and services along the value added chain of agricultural and food products, in order to realize superior customer value at the lowest possible costs" (p.11). This definition clearly recognizes the interaction of the stakeholders, the quality aspect, which includes sustainable products, as well as a necessary economical approach. "However, improving sustainability in the food production system usually leads to higher costs in the short term, while the revenues are uncertain" (Wognum et al., 2011, p. 65). If consumers are willing to pay for the necessary price increase for more sustainable food is investigated by practitioners of the food industry as well as by researchers (Wognum et al., 2011). Industry experts also saw a necessity to implement environmental and social criteria for future supply chain related policies including certification processes (Seuring & Müller, 2008b).

While most of the literature in based on industrial applications, the food supply chain differs as failures or mistakes impact human health directly through consumption or indirectly through the environment. While legislation is quick and strict when it comes to the prevention of harm towards humans (social performance), the legislation against impacts on the environment through food production lacks behind (environmental performance) but the pressure for environmental protection is increasing (Wognum et al., 2011). Managers can influence the sustainability of their products through the selection of their suppliers, the kind of used transportation systems, the location of the supply chain and packaging choices (Carter & Easton, 2011).

Growth of supply chains adds not only complexity but also impacts sustainability, which creates difficulties particularly for larger enterprises and their supply chains as more factors have to be considered (Wongnum et al. 2011). This can also be transferred to the cheese manufacturing, as a higher production uses technology that is not as sustainable as the ones of smaller manufacturers (van Middelaar, Berentsen, Dolman, de Boer, 2011; Faye & Konuspayeva, 2012). The cheese supply chain in the Scottish/English border was investigated for sustainability by Ilbery and Maye (2005). They argue that the distinguishing between organic and conventional supply chains cannot be achieved as they blend into each other within the company processes and the productions systems. Additionally they found out that alternative food supply chains are not necessarily more sustainable as well as greenwashing through various expressions is a common practice (Ilbery & Maye, 2005). The

cheese supply chain was significantly improved through technology and methods since the 1980´s to be able to increase productivity and efficiency as well as food safety and living standards of stakeholders and animals (Ruiz, Díez-Unquera, Heredia, Arrranz, Mandaluniz, Ugarte, 2011). The study of Ruiz et al. (2011) found out that added value activities such as tackling social issues and technical solutions increase the productivity and the sustainability of cheese making. The implementation of an environmental management system, for example ISO 14001, can reduce the lead times and costs and even raise the product quality (Hanson, Melnyk, & Calantone, 2004; Montabon, Melnyk, Sroufe & Calantone, 2000).

2.1.2. Environmental Issues

Dairy products such as cheese influence the "national and internationals patterns of agricultural production and trade" (Smith, 2008, p. 849). In the following sections, critical points are named, and practices that aim to reduce these are presented.

The energy consumption of the cheese supply chain is significant factor of the environmental impact. Foster, Green, & Bleda (2007) analysed the lifecycle of Swedish cheese, which shows that the by far largest percentage of energy is used to produce the milk, while the following production steps have a minor influence. Overall it takes between 8.8-26kg of CO2 to produce 1kg of cheese, which is highly depended on the used energy sources (Sim et al., 2007; Aguirre-Villegas, Kratz, Milani, Newenhouse, Passos-Fonseca & Reinemann, 2011), while it takes around 22kg of CO2 to produce 1kg of New Zealand beef, and (Lieffering, Ledgard, Boyes & Kemp, 2012). With the use of renewable energy sources the cheese production is able to become more sustainable (Smith, 2008). Another critical point is the produced greenhouse gases, which speed up the climate change. More than 90% of the greenhouse gas emissions of the cheese supply chain are produced on the farm-level, mainly through enteric methane emissions of the dairy cows, which can be reduced through different pastures and supplement feeds.

Efforts to increase biodiversity is also connected to sustainable behaviour. (Binder et al., 2012) As land is cultivated for farmland the biodiversity decreases through the decreased fauna and flora. The use of less land or pasture to increase biodiversity, while maintaining the milk production level, means that extra concentrated feeds such soy beans have to be used,

which are “intrinsically linked to the degradation of rainforests” (Binder et al., 2012, p. 216), through “de-forestation to increase grazing fields and soy production” (Wognum, 2011, p.67). Therefore the problem is only shifted to another country.

The degradation of land through agriculture is a key point of critics (Wognum et al., 2011) as the use of pesticides and fertilizers enhances the pasture growths in the first place, but as it is washed out in the waterways, it degrades the water quality and biodiversity of these. Inefficient irrigation methods additionally increase the required water supply and consume extra energy through necessary pumping. Furthermore, the soil can be damaged through over-fertilizing, chemicals, for example herbicides & pesticides, or effluent, which decreases not only the quality of the pasture but also the milk. Therefore water, fertilizer, waste, effluent as well as chemicals have to be managed efficiently, to prevent damages to the soil and harm to humans and animals, which reduce costs and also prevent a loss of reputation (Glen, 2013).

The case study of Sim, Barry, Clift and Cowell (2007) concluded that especially transportation would influence the sustainability balance of a food supply chain. Particularly airfreight is worse than sea shipping, when long distance haulage for exporting is necessary. Local food supply chains, which support mixed or organic production, are seen as relative sustainable because of their low ‘food miles’ (Smith, 2008). Additionally the cooling, packaging and storage for food impacts the environment heavily through the use of electricity and environmentally harmful refrigerants (Sim et al., 2007).

The storage and packaging of food is very important to preserve the food in the first place and reduce food waste, but the packaging also conflicts with the environmental impact of a product as recycling of certain materials, for example cling film or Tetra Packs, is not possible or only with high efforts. The redesign of packaging can produce less waste (Mollenkopf, Closs, Twede, Lee & Burgess, 2005), which decreases costs for packaging and the disposal of waste. Pollution prevention in the value chain activities need to be addressed and possible solutions implemented, but this involves a financial investment in the first place (Gupta & Pulsule-Desai, 2001). Wognum et al. (2011) demanded that “future products need to be easy to recycle and built from durable non-hazardous materials” (p. 66).

2.1.3. Social Issues

The social sustainability includes the internal supply chain social performance, as well as the external performance (Pullman, Maloni, & Carter, 2009; Wognum et al., 2011), which significantly influences the reputation of company as consumer awareness increased in recent years (Maloni & Brown, 2006).

Labour problems that have been linked to the worldwide food supply chains are low pay, labour oversupply, poor working conditions, insufficient training and education, while these conditions are particularly common in the farming sector (Faye & Konuspayeva, 2012). As the cheese supply chain is based on the dairy farming, which follows a cyclical pattern, part of the staff is only temporary or seasonal employed (Martin, 1991), which was linked to job dissatisfaction and stress by Bardasi & Francesconi (2004). The safety of warehousing and transportation, and better working conditions decrease the health and safety costs and can reduce the turnover rates and therefore less recruitment effort is needed (Brown, 1996; Carter, Ellram & Tate, 2007). If they are optimized the associated labour costs as a result of high motivation, productivity and absenteeism are reduced (McElroy, Rodriguez, Griffin, Morrow & Wilson 1993; Holmes, Power & Walter, 1996). An increased social performance in the food supply chain was also linked with an improved product quality, which can add value to the product and create a competitive advantage (Pullman et al., 2009).

The social stewardship within the cheese supply chain expands also to the animal welfare and health, which includes "humane approaches to handling, housing, transport and slaughter" (Maloni & Brown, 2006, p. 35). The intensified animal farming lead to various scandals as bad living conditions and treatment of animals were exposed publically, which not only damage the reputation of a company but are also able to diminish sales as consumer awareness rises. Animal welfare improvements have a positive impact of the quality of the milk (Greer, 2013) and reduce future consumer and NGO concerns. It is also perceived as an indicator for food safety and quality. Therefore, the maintaining of animal health and body conditions should be supported through early identification, for example daily body scoring, and appropriate treatment (Maloni & Brown, 2006). Therefore, the workforce has to be trained and educated to be able to identify problems promptly and react accordingly (Glen, 2013). Particularly local food supply chains are able regenerate rural business and to support local communities, which increases job satisfaction and the reputation of a company (Smith,

2008). The economical outcomes “are extremely diverse, and many are impossible to quantify” (Glen, 2013, p.1).

2.1.4. Transparency

Sustainability efforts can create extra costs and the need of extra working hours; to increase the economic impact through the utilization in marketing the efforts have to be published. Best practices recommend that the consumers can inform themselves about those sustainability efforts and must be able to access information by themselves (Isenmann, 2004; McDonald & Oates, 2006). Through transparency in the food supply for example through environmental reporting, traceability codes and quality labels, it is easier for the consumer to determine the quality and makes it easier to assess or at least give an impression of the sustainability efforts in the supply chain of the product (Wognum et al., 2011). Therefore transparency should be part of the sustainability efforts to promote it towards the consumer and use it for effective marketing. This can be further sub-classified in vertical and horizontal transparency. The vertical transparency or chain transparency is related to the requirements and legislation in a defined supply chain. While the horizontal dimension distinguishes between requirements and legislation for an individual company of a supply chain, which includes corporate strategy as well as operational processes that are made public towards stakeholders and consumers through corporate reports or other platforms (Kalfagianni, 2006). More sustainable practices and processes enhance the public reputation of an organization, when they are promoted publically, which attracts customers and suppliers (Ellen, Webb & Mohr, 2006) and is even able to entice employees (Capaldi, 2005). Lifecycle assessment can be used to show the environmental impact of a specific product to stakeholders, as it adds the “inputs and outputs of the processes in a supply chain, such as farming, production and transport” (Wognum et al., 2011, p. 67). Wognum et al. (2011) state that transparency of food supply chains is obstructed by social and technical rigidities, because primarily the companies copy each other as they have to follow the same legislation and social norms and secondly most companies are small, which restricts them in their potential actions. With the implementation of standards and certifications such as environmental management systems in line with ISO 14000 series outdated administrative control systems can be updated to fulfil or exceed environmental policies and make it easier to publish compliance. Admittedly these management systems can also hinder extra or innovative ambitions (Wognum et al, 2011).

2.2. Sustainable Supply Chain Management

The theory of sustainable supply chain management is part of the supply chain management research, which can be described as, "the systemic, strategic coordination of the traditional business functions within a particular company and across business within the supply chain for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole" (Mentzer, DeWitt, Keebler, Min, Nix, Smith & Zacharia, 2001, p.18). Another definition from Lambert, Croxton, Garcı´a-Dastugue., Knemeyer & Rogers (2006) is "the integration of key business processes from end-user through original suppliers, that provides products, services and information that add value for customers and other stakeholders" (p.2).

The research in the Sustainable Supply Chain Management was conceptualized in early social and environmental studies (Carter & Easton, 2011). Seuring and Müller (2008b) reviewed 191 papers about sustainable supply chain management in their paper and discovered that only 31 papers are actually holistically addressing sustainability, while the earliest were published 2002. The movement towards a more sustainable supply chain evolved from the corporate social responsibility policies, where environmental, safety and social issues are highlighted. Nowadays sustainable supply chain management should be incorporated in the Corporate Social Responsibility Guidelines of the organization, which are common practice in many industries now (Gupta & Pulsule-Desai, 2011). The demands of consumers, non-governmental organisations, and the government for transparency of corporate activities and impacts lead to the adoption of corporate social responsibility reports, which cover not only societal topics, but also environmental related reports and statistics (Seuring & Müller, 2008b). It started with the addressing of problems in the supply chain, and later evolved to a standalone research field about the sustainable supply chain. This is also further demonstrated by the 68 percent of the global 250 firms, which published an annual sustainability report in 2004; 80% of those reports contained consideration directly sustainability within the supply chain management (Carter & Rogers, 2008).

Carter & Rogers (2008) integrated the concept of sustainable development for their definition of SSCM and stated: "Sustainable supply chain management is the strategic, transparent integration and achievement of and organization´s social, environmental and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply

chains." (p. 368). Gupta & Pulsule-Desai (2011) defined sustainable supply chain management as a set of managerial practices, which include three perspectives. Firstly, "firms must view environmental impact of their activities as an integral part of decision making, rather than a constraint imposed by government regulation or social pressure, or as a fad to exploit by appearing to be green. Second, the firms must pay attention to environmental impact across the entire value chain, including those of suppliers, distributors, partners and customers. Third firm's view of sustainability must transcend a narrow functional perspective and encompass a broader view that integrates issues, problems and solutions across functional boundaries." (p. 235). So the sustainable supply chain management is a fight between ecology against economy (Gupta & Pulsule-Desai, 2011), which differs from the view of Carter & Rogers (2008) as well as from Seuring & Müller (2008a), who base their definition on the triple bottom line (Elkington, 1997).

2.2.1. Theoretical framework of SSCM

The theoretical framework of sustainability in the supply chain management (SSCM) was modelled by Carters & Rogers (2008), which was based on the Triple Bottom Line of Elkington (1997). Sustainability is found at the intersection of the environmental, social and economic performance of a supply chain, which "explicitly directs managers to identify those activities which improve economic performance and dictate the avoidance of social and environmental activities which fall outside this intersection" (Carter & Easton, 2011, p.48).

Carter & Easton (2011) describe the four facilitators of SSCM , which were already identified by Carter & Rogers (2008):

"1. Strategy: holistically and purposefully identifying individual SSCM initiatives which align with and support the organization's overall sustainability strategy,

2. Risk management, including contingency planning for both the upstream and downstream supply chain,

3. An organizational culture which is deeply engrained and encompasses organizational citizenship, and which includes high ethical standards and expectations (a building block for SSCM) along with a respect for society (both within and outside the organization) and the natural environments; and

4. Transparency in terms of proactively engaging and communicating with key stakeholders and having traceability and visibility into upstream and downstream supply chain operations." (CarteR & Easton, 2011, p. 49)

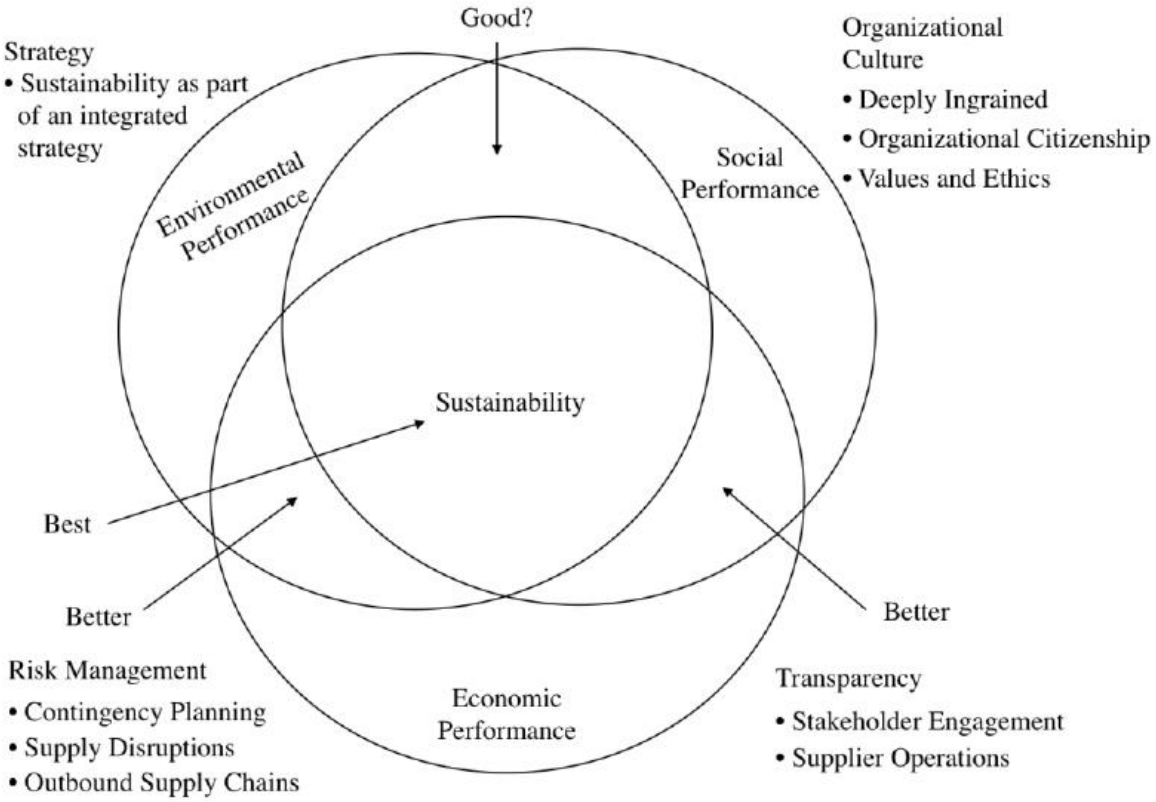

Figure 2: The triple bottom approach of SSCM (Carter & Rogers, 2008, p.369)

Supply chain risk is "the potential occurrence of an inbound supply incident which leads to the inability to meet customer demand" (Carter & Easton, 2011, p.366). The risk management includes not only financial issues but also risks that lay in products, environmental polluting substances, employee and public safety. There are several possible risks such as natural disasters, poor demand forecasting, failures in the coordination in the supply chain or possible legal action, if environmental or social criteria are not achieved (Carter & Easton, 2011). A proactive commitment towards sustainability lowers the risk of governmental forced and therefore cost intensive regulations (Porter & van der Linde, 1995).

Transparency is an important key issue that needs to be targeted proactively to educate consumers about sustainable efforts in the supply chain to increase the positive reputation. Through the new communication technologies efficient and fast dissemination of

information is possible, this can be an advantage and a disadvantage as is can also be used for a fast reputation loss among consumers. Therefore companies need to respond to feedback of various stakeholders and advance practices in the whole supply chain. Green marketing can be boosted through more transparent insights in the supply chain (Rivera-Camino, 2007).

The strategic view on sustainability needs to be embedded in the organisation. To work effectively as the green perspective should be incorporated in the decision making process. This can lead to new ideas around the "economic rationale to firm´s existence, behaviour, structure and relationship to markets" (Gupta & Pulsule-Desai, 2001, p.237). The sustainability concept must find its place in the corporate strategy, as they cannot function efficiently if treated independently. The intersection between environmental performance and social performance is only labelled as "good" as pure environmental and social initiatives are normally cost intensive and therefore not economical (Carter & Easton, 2011). There are several possibilities that lead to a more sustainable supply chain.

These definitions and the framework show a rather unrealistic scenario, and this is why SSCM and a sustainable supply chain have to been seen as an ideal rather than a reachable concept. This was also supported by Pagell & Wu (2009), who studied 10 cases who claimed to have reached the status. However they were not able to find one that would fit these definitions, while they companies would still be "significantly more sustainable than others in their industry" (Pagell & Wu, 2009, p. 38). They further stated that "to be truly sustainable a supply chain would at worst do no net harm to natural or social systems while still producing a profit over an extended period of time; a truly sustainable supply chain could, customers willing, continue to do business forever" (p.38).

2.2.2. Motivators for SSCM

When companies are in the focus and under pressure by NGOs or consumers because of their lack in environmental or social practices, they face the loss of reputation, which ultimately leads to losses in market share and therefore profitability (Smith 2008; Maloni & Brown, 2006). While other companies are proactive and prevent scandals like that, the question arises: What really motivates companies to implement SSCM? The literature provides two main categories: Risk Management and Competitive advantage. In the following section both reasons are further explained.

As already mentioned above, public interest in sustainability leads to a higher awareness of managers around that topic, who adapted sustainability guidelines into their firm's strategy to "plan for, mitigate, detect, respond to, and recover from potential global risks" (Closs, Speier & Meacham, 2011, p.102), which could diminish reputation and further cause financial consequences. While research often refers to customers' demands and NGO pressure as a driver for sustainability efforts (Korpela, Lehmusvaara & Tuominen, 2001; Childerhouse, Aitken & Towill, 2002), the Delphi study of Seuring & Müller (2008b) shows that industry experts rather see future government regulations as the motivator rather than NGO pressure. Closs et al. (2011) followed that statement in their study. When legal pressures for sustainability efforts in global supply chains differ radically, the opportunity to relocate can be used to reduce operating expenditures, which is not always possible.

Gold, Seuring & Beske (2010 believe the prime reason companies desire to build a sustainable supply chain is to help achieve competitive advantage based on Barney´s (1991) of the resource based view (Gold, Seuring, Beske, 2009 and Barney, 1991). Gaining a competitive advantage leads companies to implement environmental and sustainability programs (Ayuso, 2006), but these are restricted by the financial power of the individual company (Hahn & Scheermesser, 2006). The basis for a sustainable supply chain is the competencies and resources to cultivate relationships with suppliers and customers of each individual company or the supply chain (Gold et al., 2009). The environmental cooperation in a supply chain, that aims to plan together and solve environmental problems, increases the manufacturing and environmental performance (Vachon & Klassen, 2006). Also long-term partnership, which shares a common culture, can effectively grow together interdependently to form a sustainable supply chain (Spekman, Kamauff & Myhr, 1998; Gold et al., 2009). The strategic collaboration between the partners along with specific core competencies help to create a competitive advantage, which is known as the collaborative paradigm. They create core competencies with "valuable and rare resources and capabilities" (Gold et al., 2009, p.239) which they can then use to implement environmental and social programs to gain a unique competitive advantage, for example to get a "licence to operate or expand into certain international markets" (Smith, 2008, p.853). "Companies that proactively address environmental and social concerns can influence, government regulation when this regulation is modelled after a company´s existing production and supply chain processes leading to a difficult to replicate competitive advantage for companies and their suppliers" (Carter &

Dresner, 2001, p. 19). Pro-activeness is an inherent part of the sustainable development management style (Wognum et al., 2011).

The following figure shows the complex interaction between companies that is needed to build a more sustainable supply chain.

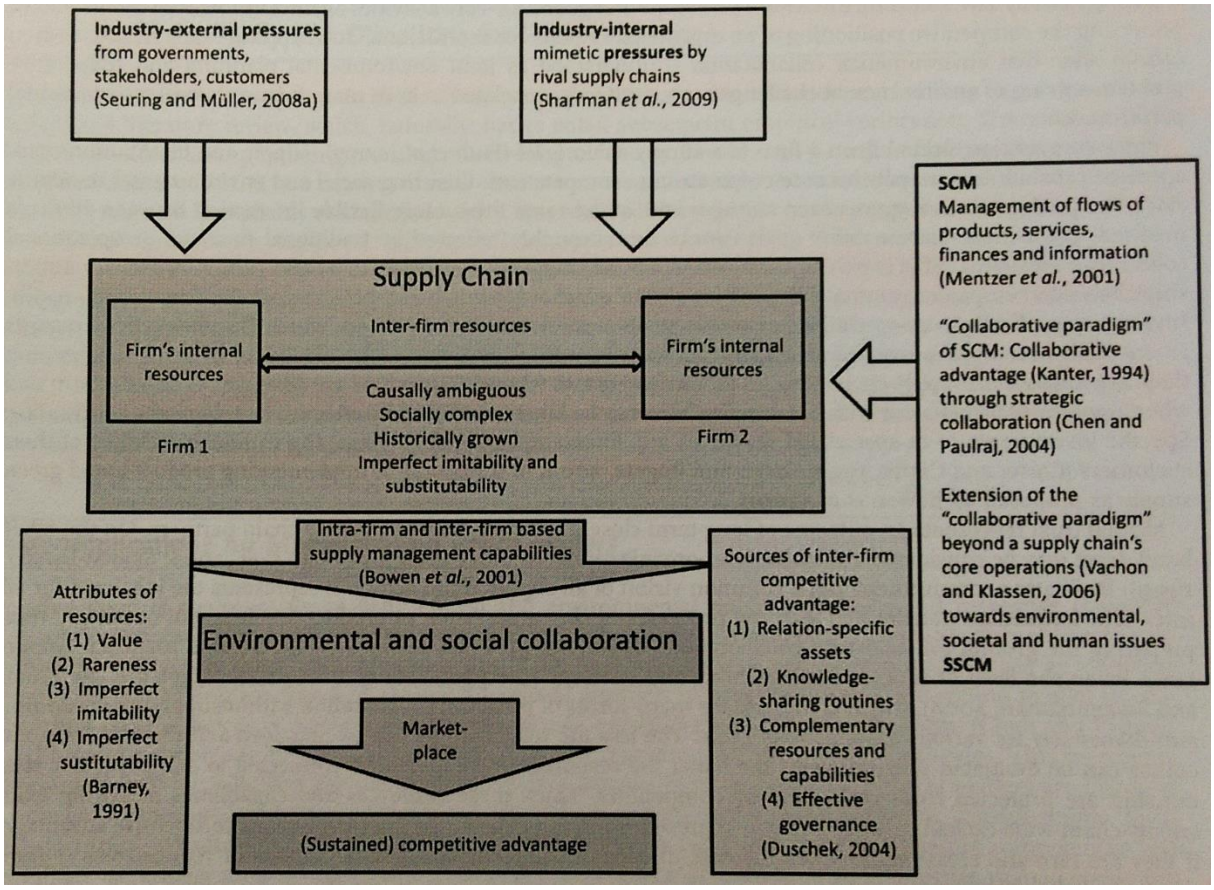

Figure 2: The SSCM as a catalyst of sustained inter-firm competitive advantage (Gold et al., 2009, p. 239)

2.2.3. The Business Environment and SSCM

A supply chain is dependent on the business environment it is working in, which is impacted by the social, cultural and economic situation (Osinga & Hofstede, 2006). The various characteristics of inputs and the companies in a supply chain impact the feasibility of possible SSCM (Smith, 2008; Trienekens, 2011), which can be constrained by insufficient financials for investments, governmental support, know-how, educated workforce, technology and infrastructure (Osinga & Hofstede 2006; Smith 2008; Trienekens, 2011). Additionally 'cultural norms, individual and group behaviours, role of government and

community, relationship with science, and relationship with the natural environment" (Linton et al., 2007, p. 1079) critically impact the attitude and interpretation towards sustainability.

Furthermore the institutional environment impacts the organizational life. "Regulative institutions encompass legislation and government regulations and policies that companies can use and/or have to comply with. Normative institutions are embedded in business practices, business policies and ethical standards. Cognitive institutions reflect the way people interpret and make sense of the world around them on the basis of rules and schemata. Hence, diverse cultural belief systems, values and identities inform people (in different roles as consumers, producers, policy makers, citizens, etc.)" (Trienekens, 2011, p. 56). While regulative institutions impact sustainability efforts through their politics, normative and cognitive institutions impact the view on sustainability practices (Osinga & Hofstede, 2006).

The nature of the inputs in a supply chain influence sustainability efforts, as they range from commodity products to customer specific products. A commodity is "a mass-produced unspecialized product whose wide availability typically leads to smaller profit margins and diminishes the importance of factors (as brand name) other than price" (Merrian-Webster, 2016). Pure commodity supply chains are seen as non SSCM-friendly, as the lack of traceability (Carter & Rogers, 2008). Smith (2008) further concluded that companies that rely on commodities or near commodities have to "create parallel, smaller, expensive identity preserved supply chains in-house before making any higher-level sustainability claims, thereby negating most of the transaction and bulk handling cost saving introduced by the use of baseline standards and management system" (Smith, 2008, p.852). A possible commodity for that case would be milk powder. More customer-specific products on the other hand use a supply chain where knowledge and compliance between the manufacturer and all the suppliers and producers is already implemented which makes it easier to further apply SSC practices (Trienekens, 2011). This is only possible is the when the supply chain is closely linked as collaboration between the partners is essential, while high quality and specialised products can emerge from it (Smith, 2008; Trienekens, 2011).

The structure of a supply chain is dependent on the number of stakeholders, flow of the goods, knowledge & money and the power structure. To introduce SSCM the "principles of accountability, transparency and stakeholder engagement" (Yakovieva, 2009, p. 3; Carter & Rogers, 2008) have to be considered. Short supply chain make it easier as the number of participants that have to convinced, engaged and further controlled is lower (Smith, 2008)

and information and knowledge can be spread easier. Additionally a corporate culture that encourages decisions of employees towards sustainability, evaluates them on the triple bottom line and allocates innovation capabilities for it is supporting the introduction of SSC practices (Carter & Rogers, 2008; Pagell & Wu, 2009). Seuring & Müller (2008a and 2008b) also see the requirement for proactive approaches of individual supply chain members.

2.2.4. Governance structures

The movement towards SSCM is also relying on the collaborative governance as it ensures to improve the environmental and social performance of a supply chain (Smith, 2007; Seuring & & Müller 2008a; Pagell & Wu, 2009). "The learning that results between buyers and suppliers concerning environmental and social activities can have a strong positive influence on supplier performance and reduced operating costs in supply chain relationships" (Carter & Rogers, 2008, p. 374). The latter is achieved as the collaborative approach surges transparency and communication, which decrease monitoring costs to prevent opportunistic behaviour (Carter & Easton, 2011). Seuring and Müller (2008a) distinguish between the governance for "supplier management for risks and performance" (p.1704) and the governance for "supply chain management for sustainable products" (p. 1705).

The first governance strategy is based on the already mentioned motivator, to reduce the risk of damaged reputation through deprived environmental and social performance of supply chain members, which could ultimately even cause problems of operational processes and reduce overall performance (Carter & Rogers, 2008; Seuring & Müller, 2008a). The Figure 3 provides an overview of this governance strategy.

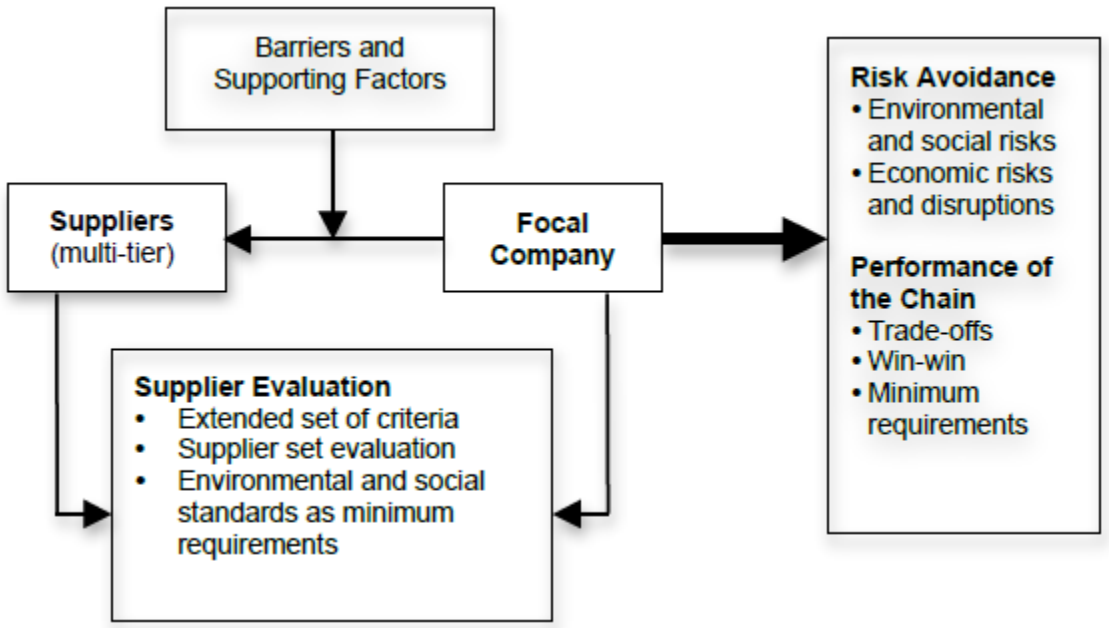

Figure 3: Supplier management for risks and performance (Seuring & Müller, 2008a, p. 1706)

Carter and Rogers (2008) suggest integrating suppliers vertically "as dependence on resources rise" (p.372) to simplify monitoring, evaluating and reporting even in complex or dynamic market situations. As vertical integration is not always an option, the auditing and controlling can be supported through established management system or certification standards, for example the ISO 14001 standard provides a framework for the environmental management system while the auditable SA 8000 certification provides a minimum standard for the social performance, even it is not adopted widely (Seuring & Müller, 2008a). The implementation of certifications also has a positive effect on the performance of a company, for example the ISO 9000 standard is correlated with increased quality and the ISO 14000 standard can increase the environmental performance. Both standards also have positive impact on the financial performance, while the effect in influenced by the depth of implementation (Castka &. Corbett, 2015). Smith (2008) notices that immediate suppliers for food supply chains, for example farmers, can be forced by contract to "incorporate higher-level sustainable agriculture criteria" (p. 855). Especially in food supply chains the implementation of quality standards are vital (Trienekens, 2011).

With the definition and implementation of standards, the actual application of the relevant suppliers has to be carefully considered so "modification based on local information […and…] circumstances" (Perez-Aleman & Sandilands, 2008. p.40) is possible. Incentives such as price premiums and long term contracts provide security and help to implement standards,

as uncertainty, investment costs and changes of current costs may discourage suppliers (Perez-Aleman & Sandilands, 2008).

The second governance concerns the production of sustainable products, which are "products that have or aim at an improved environmental and social quality, which can be related back to the already mentioned implementation of environmental and social standards" (Seuring & Müller, 2008a, p. 1705). The goal of this governance strategy is to "satisfy customers and gain competitive advantage in the market" (Seuring & Müller, 2008a, p. 1705), which matches the second mentioned motivator for SSCM. The Figure 4 provides an overview of the process and emphasises the increased collaboration compared to the last governance model.

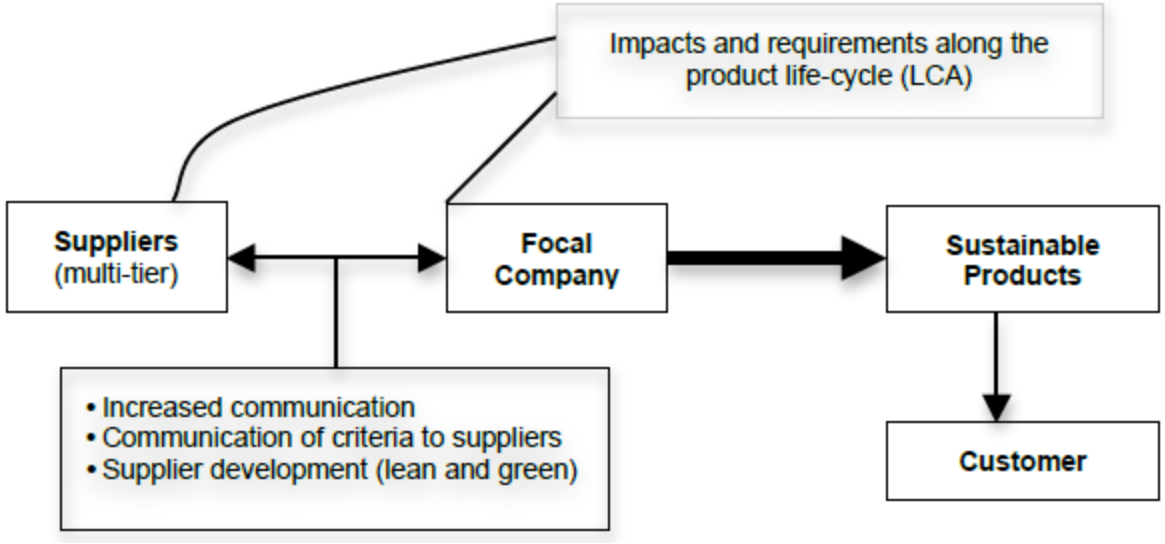

Figure 4: Supplier management for sustainable products (Seuring & Müller, 2008a, p. 1706)

Likewise standards, certifications and auditing should also be used to monitor the introduced environmental and social practices. "The basic aim of the supply-base continuity which aims to ensure that all members of the chain not only stay in business, but also that they to do in manner that allows them to thrive, reinvest, innovate and grow" (Pagell, Wu, & Wasserman, 2010, p. 6). This means that focal companies have to support their suppliers when the sustainability demands go beyond the capabilities of potential suppliers through investments in skills and technology before the actual production of sustainable products (Seuring & Müller, 2008a), for example agricultural technology for instance land management methods. Additionally larger companies can "provide credit or long-term loans at preferential rates to farmers or invest directly in agronomic advice, farmer training, better growing material,

inputs or capital equipment" (Smith, 2008, p. 856; Beske, Land & Seuring, 2014). Information and knowledge transfer throughout the supply chain has to be emphasized to develop an understanding for the different stages of the supply chain and the need of the social and environmental practices of all actors (Seuring & Müller, 2008a; Beske et al., 2014).

2.2.5. Partnerships

While the governance approaches are focusing mainly on the supply chain members, the integration of supporting partners such as NGOs, government and universities can assist the implementation of sustainable practices (Perez-Aleman & Sandilands, 2008; Smith, 2008; Trienekens, 2011). The creation of environmental and social best practices is an investment that needs time, resources and money (Linton et al., 2007; Vurro, Russo & Perrini, 2009). The knowledge transfer with partners reduces costs, as it is faster and uses fewer resources than creating it exclusively within the supply chain (Mooradian, Renzl, & Matzler, 2006; Beske et al., 2014). For example third party certification firms can consult before the implementation as well as later on audit the changes. The involvement of stakeholders provides not only access to knowledge and skills it also enlarges the network (Smith, 2008; Trienekens 2011). Universities and government agencies can provide specialised knowledge for particular environmental and social subjects. Through the involvement with the government the development of policies and infrastructure can be influenced, which reduces future costs. The government may also provide subsidisations and credits for sustainable investments. While NGOs can provide training and help to establish local networks (Perez-Aleman & Sandilands, 2008).

The collaboration with other stakeholders outside the supply chain also helps to "overcome the limitations of top-down approaches towards promoting sustainability" (Vurro et al., 2009, p. 610). The inclusion of local communities, NGO and the government endorses a wider perspective and relevance for the stakeholders and enhances the effectiveness of the efforts.

Small suppliers may struggle to adopt new environmental and social practices, so it is necessary to integrate them and experts in the development of new initiatives and standards (Perez-Aleman & Sandilands, 2008). Additionally smaller enterprises and even competitors, for example artisan cheese manufacturers, should be integrated in such processes as they "will never have the power to transform agricultural systems or improve the sustainability of

mainstream near- commodity and commodity supply chains" (Smith, 2008, p. 856). Therefore, multi-stakeholder initiatives, which include suppliers, governmental agencies, universities, and NGOs, can lead towards a more sustainable baseline of commodity supply chains, for example through improved sustainability guidelines for agriculture (Smith, 2008).

2.2.6. Critique on the Theory

The sustainability research was criticized such as every new field. The implementation of SSCM practices increases "the complexity associated with defining, coordinating and interacting with stakeholders" (Linton, Klassen & Jayaraman, 2007, p.1080), which can cause inefficiencies in decision processes. Especially the often used win-win paradigm gave sceptics reasons for critique. One of the first recognitions of trade-offs in sustainability was made by Margolis and Walsh (2003), where they request to "clarify the competing considerations, probe what gives them weight and explore their relationship" (p. 284). While Bansal (2005) stated, "sustainable development is achieved only at the intersection of the three principles" (p. 199), others argue that this is mostly not achievable (Kaptein & Wempe, 2001; Hahn et al., 2010). "Trade-offs and conflicts between economic, environmental and social aspects in corporate management and performance represent the rule rather than the exception" (Hahn et al., 2005, p. 218). The criticized win-win paradigm of sustainability research is based on the assumption that the implementation of management practices that enhances environmental stewardship and social responsibility lead to superior economic performance. This win-win paradigm can be found in several publications in different research areas, for example that social efforts increase the financial performance or that environmental efforts increase the economic performance (Orlitzky, Schmidt, Rynes, 2003; Burke & Logsdon, 1996).

Hahn et al. (2010) argue that if "sustainability based on the win-win logic will be restricted to conflict-free solutions with little ambition to fundamentally change core business practices for the sake of sustainable development" (p. 219). They conclude that the win-win paradigm limits potential practical solutions towards sustainability and restricts the analysis of initiatives and strategies. This ultimately means that sustainability is not promoted and a pure focus on profit maximization is embraced.

The Governmental Business website of New Zealand follows the win-win-paradigm as well and promotes that sustainability does not hinder growth and efforts would be "creating value by providing […] a marketing advantage, driving innovation, developing corporate responsibility and global awareness, reducing costs, improving productivity, enhancing brand integrity and corporate reputation" (BUSINESS.GOVT.NZ, 2015) Sustainability is not always a win-win situation, as it is also a trade-off. A framework for identification of these trade-offs was constructed by Hahn, Figge, Pinkse & Preuss (2010).They distinguish between societal, industry, organisational and individual level, these levels can assigned to the outcome, temporal and the process dimension. An overview is given in Figure 5.

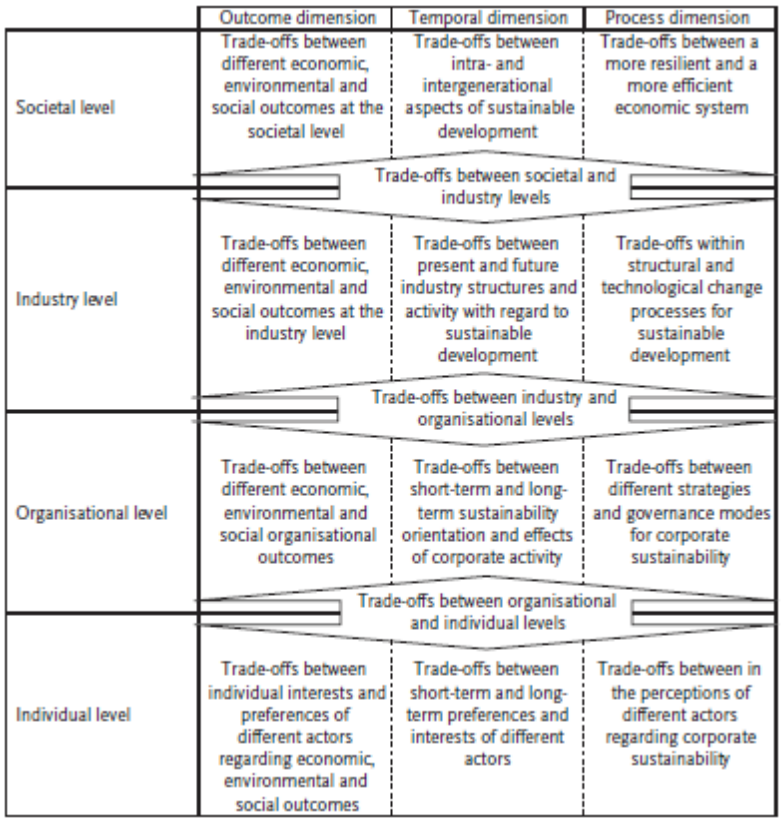

Figure 5: Analytical framework for trade-offs in sustainability (Hahn et al., 2010, p. 223).

The study of Toman (1994) also identified a trade-off between economics and sustainability, which was heavily influenced by social factors such as human values and behaviour. Additionally sustainability is often assessed through indicators or key figures, which was critiqued by Binder et al. (2012) as it would focus often more on the environmental side of sustainability, while the economic and social aspects are underrepresented. They further notice a lack of practical use of the research findings as well as difficulties in decision making when goals conflict with each other and interactions between indicators are unclear. Smith (2008) stated: "The sheer complexity of the sustainability concept involving an

enormous range of social and environmental issues, trade- offs, time scales and priorities, makes marketing 'produced using (more) sustainable agriculture' and 'delivered to you through a (more) sustainable supply chain' an impossible proposition" (p.852).

Additional costs and restrictions required for production for more sustainability in the supply chain can be utilized as opportunities that lead to a higher revenue and a better environmental impact (Subramanian, Talbot, Gupta, 2010). In the given literature there was a trend to focus on consumer products companies as they adopt environmental and social initiatives earlier (Carter & Easton, 2008). This literature review leads to the conclusion, that sustainability is an important aspect for companies and "is not simply a matter of good corporate citizenship – earning brownie points for deducing noxious emissions from your factory or providing health care benefits to your employees [...] Sustainability is now a fundamental principle of smart management (Savitz & Weber, 2006, p. 14). Therefore companies, who invest in sustainability in their supply chain, have the opportunity reduce their risks, create a competitive advantage and outperform the market (Carter & Rogers, 2008).

2.3. Industry Overview

As traditional cheese is a dairy product, the industry as a branch of the dairy industry, which contributes the biggest industry of New Zealand: food processing.

With nearly 6.7 million dairy cattle 2014 the growing dairy industry is responding to the strong international demand, especially form Asian countries. The growth was well fuelled by rising milk solid prices as they nearly doubled between 2007 and 2011. But the growth trend continues even with lower prices, which are still considered to be on a high level (Statistics NZ, 2015c).

The North Island herd with around 4 million cows in 2014 is growing slower than the South Island, which had a significant increase in numbers from 1.4 million in 2005 to 2.7 million in 2014 (Statistics NZ, 2015b). This surge reduced the sheep herd down from 37 million in 2007 to 29.8 million, which is comparable to the numbers in 1943 (Statistics NZ, 2015c).

The dairy herd on both islands produced 20.7 billion litres of milk in 2014 (DCANZ, 2015b). In 2013 New Zealand was the seventh largest milk producing country worldwide (AHDB, 2015). More than 95% of the dairy products are exported all over the world, mainly to China,

the USA, Japan, the European Union, Malaysia, Australia, Philippines, Taiwan, Singapore, Belgium, Venezuela and Saudi Arabia (DCANZ, 2015a). The dairy industry contributed with just under NZ$ 17 billion to the exports revenue (Statistics NZ, 2015a) and employs more than 40.700 people in New Zealand (DairyNZ, 2014). The table 1 gives an overview of the exported dairy and casein of New Zealand. The numbers for 2015 are estimated, but the lower prices for dairy products will lead to lower overall export revenue while the volume slightly increased.

	2011	**2012**	**2013**	**2014**	**2015 P**
NZ overseas trade indexes – value in million NZD					
Dairy and Casein	12,005	12,478	12,191	16,876	12,182
Percentage change	27.2	3.5	-2.3	38.4	.21.9
Price Index base June quarter 2002 = 1000					
Dairy & Casein	1399	1334	1154	1593	1200
Percentage change	22.9	-4.9	-13.5	38.0	-24.6
Volume Index (base June quarter 2002 = 1000					
Dairy and Casein	1374	1491	1684	1689	1751
Percentage change	3.5	8.5	12.9	0.3	3.7

Table 1: Overview of the exported dairy and casein of New Zealand (Statistics NZ, 2015a)

The Table 2 splits up the exported dairy products in different categories, while a solely cheese subcategory is not provided by Statistics NZ (2015a). The available data also fails to provide detailed information about imported cheese. With over 1.5 billion NZD export revenue in 2015 cheese and curd represent over 3.2% of New Zealand's export revenue.

Commodity group	2013	2014	2015	% change (2013–14)
Dairy products	**12,489,894**	**17,163,964**	**13,479,210**	**-21.5**
Milk and cream, concentrated	6,928,513	10,499,047	7,053,506	-32.8
Butter	1,909,907	2,700,855	2,219,443	-17.8
Cheese and curd	*1,441,408*	*1,482,220*	*1,557,400*	*5.1*
Casein and caseinates	872,290	1,045,686	1,144,996	9.5
Milk and cream, concentrated	6,928,513	10,499,047	7,053,506	-32.8

Table 2: Selected New Zealand exports (NZ$(000) fob for exports, NZ$(000) cif for imports) (Statistics NZ, 2015a)

Most of the cheese is produced by the big dairy companies of NZ in industrial dairy processing plants. However there is a growing number of small to medium sized cheese manufactures that mostly specialised in the production of certain artisan cheese. Different manufacturers produced 325 million tonnes of cheese in 2014. Half of the cheese production is cheddar-type cheese, while other popular varieties include Mozzarella, Gouda and Egmont (Coker et al., 1997). The forecast for 2015 by the USDA (2015) assume only 208 million tonnes of cheese will be produced in New Zealand, while there is a trend towards more fresh cheeses such as Mozzarella.

More than 275 million tonnes were exported to other countries (Indexmundi, 2015b), which is just under 12% of the total dairy export (Godairy, 2015; Statistics NZ, 2015a). Most of the exported cheese is further processed, for example for the fast food market or is used in cheese powders and sauces (Coker et al., 1997). The biggest importing countries of New Zealand's cheese are given in Table 3. Asian countries hold a major share in the export revenue from cheese as they do overall for dairy products as mentioned before. The cheese is mostly produced with conventional methods; only a small percentage is produced organically, besides only three organic cheese manufacturers are certified by BIO GRO in New Zealand.

Rank	Country	2013	2014	2015	% change (2014–15)
1	Japan	310,865	319,725	284,620	-11.0
2	Australia	211,859	233,087	244,774	5.0
3	China	100,290	150,916	190,590	26.3
4	South Korea	132,983	78,310	74,653	-4.7
5	Philippines	58,995	55,455	71,176	28.4
6	Saudi Arabia	69,338	60,656	69,347	14.3
7	Indonesia	61,873	54,427	63,468	16.6
8	USA	50,701	7,833	58,141	642.2
9	Taiwan	35,055	38,987	43,213	10.8
10	Egypt	34,477	42,882	41,788	-2.5
Total		**1,441,408**	**1,482,220**	**1,557,400**	**5.1**

Table 3: Top 10 New Zealand exports of cheese and curd products (NZ$(000) fob) (Statistics NZ, 2015a)

The cheesemakers are organised through the New Zealand Specialised Cheesemakers Association [NZSCA], which represents nearly all cheese related companies and other distributers. The milk suppliers are associated mostly with the dairy industry, which has several associations that represent the dairy industry, with the biggest one being Dairy NZ.

Most of the cheese in New Zealand is produced from cow milk, while a small proportion is also made from goat and sheep milk cheeses. Recently even vegetarian variations started to be available on the market. The available data does not allow distinguishing between the different types, which would be interesting with regard to further subcategorise in this research. The supply chain model for this study is adopted from Ilbery & Maye (2005), who created a simplified model of the cheese supply chain in the United Kingdom. A graphic of the model can be viewed in Figure 6. The supply chain of New Zealand additonally integrates milk powder producers as industrial cheese making often adds powder to fresh milk "to increase the yield of cheese" (Pearce, n.d., p. 5).

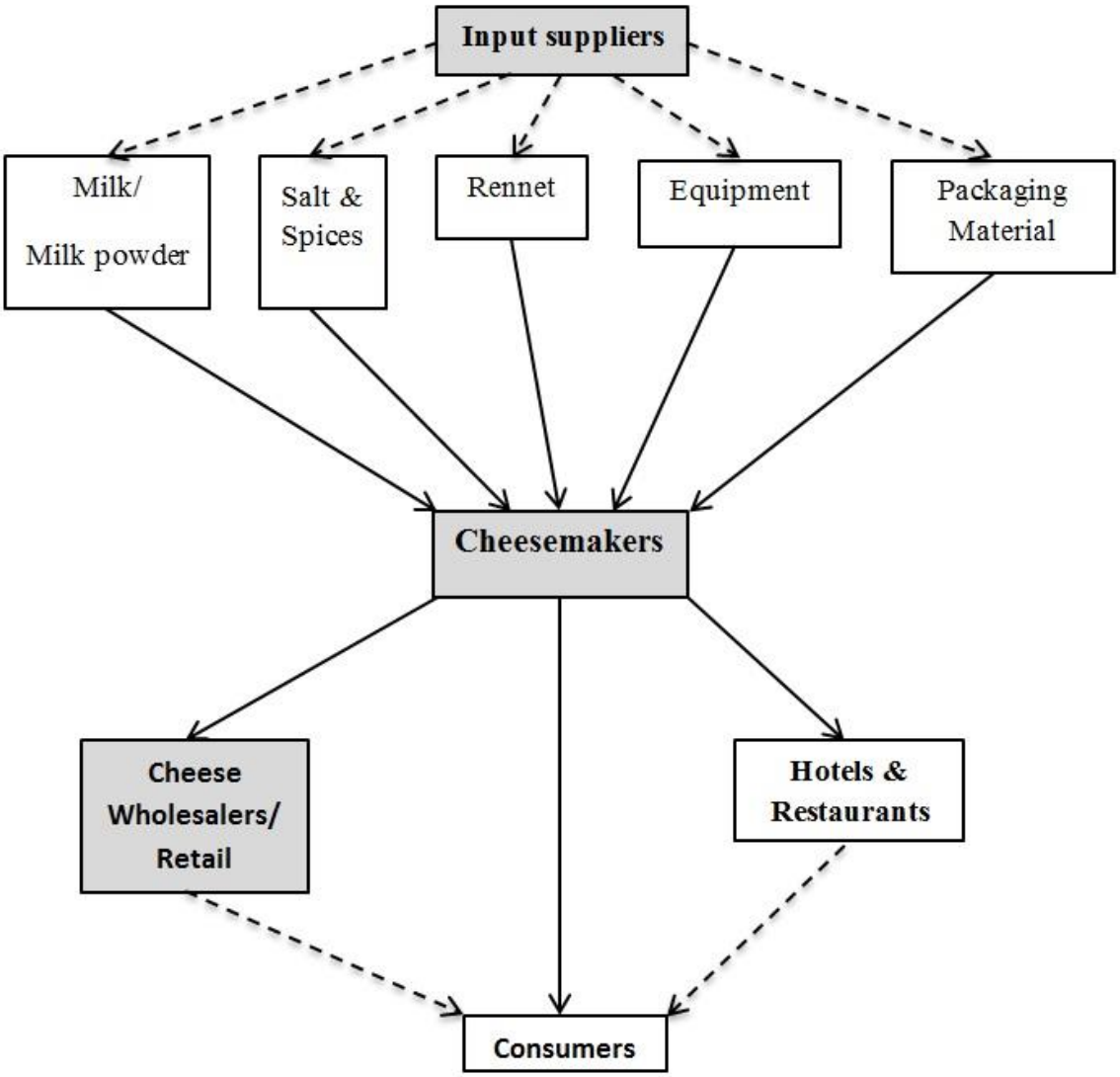

Figure 6: An overview of the Cheese Supply Chain adapted from Ilbery & Maye (2005, p. 338)

3. Methodology

In the following chapter describes the research methodology as well as the design of this study.

3.1. Research Design

The aim of the research is to understand the sustainability efforts of the cheeses supply chain of New Zealand, which were not researched specifically yet. Through the comparison with the relative new theory of sustainable supply chain management, which focuses not separately on environmental or social issues, but bases sustainability on the triple bottom line (Carter & Rogers, 2008; Seuring & Müller, 2008a), a greater understanding for practices that lead to a more sustainable supply chain can be achieved. Due to the complexity and the exploratory nature, this study adopts a qualitative research approach through case studies of New Zealand based cheese companies (Liamputtong, 2013), which is able to provide "more depth an greater potential for new insights and perspectives" (Hofstede, Fritz, Canavari, Oosterkamp & van Sprundel, 2010, p. 678). As qualitative research puts emphasis on context, it is able to deliver a holistic view of reality "to discover patterns that emerge after close observation, carful documentation and thoughtful analysis" (Cavana, Delahaye & Sekaran, 2001, p. 135). The aim of qualitative research is to "capture lived experiences of the social world and the meanings people give these experiences from their own perspective" (Corti & Thompson, 2006, p.297).

An inductive approach through the already stated research questions was chosen to clarify the purpose of this case study and guide in the research process (Voss, Tsikriktsis & Frohlich, 2002; Liamputtong, 2013). The methodological framework follows the phenomenology of the German philosopher Edmund Husserl from 1913, which "aims to examine the lived experience of a person or several people in relation to a concept or phenomenon of interest" (Liamputtong, 2013) as the insights of practitioners towards sustainability are explored to create compare it with the theory of sustainable supply chain management.

3.2. Case study

Yin (1994) stated that for the appropriate use of a case study "(a) the type of research question posed, (b) the extent of control an investigator has over actual behavioural events, and (c) the degree of focus on contemporary as opposed to historical events" (p.) has to be considered and it can be deemed appropriate when " a how or why question is being asked about the contemporary set of events, over which the investigator has little or no control" (p.9). According to Voss et al. (2002), a case study can be used for the exploration and theory testing or refinement, as it attempts "to examine more deeply and validate previous empirical results" (p. 199). Furthermore, it is a superior instrument to research emergent practices and helps the researcher to realize significant features, factors or issues (Myers, 2009). As the fundamental research question asks what the firms of the cheese supply chain are doing to be more sustainable and how these practices make them more sustainable, a case study fits the proposed research. Case studies were also used in the researched literature (Pagell & Wu, 2009), and were seen as a valuable tool to gain empirical evidence (Carter & Eason, 2011; Seuring & Müller, 2008b). To create greater insight in the sustainability efforts of the cheese supply chain a single company would not be sufficient; therefore multiple cases have to be considered. Also known as collective case study, it enables the researcher to view different aspects of the issue (Liamputtong, 2013). A multi-case study has the advantage of increased external validity compared in comparison to a single case study. Furthermore, the chance of observer bias is reduced. However more resources are needed and the depth per case is less compared to a single case study (Voss et al., 2002). Yin (1994) adds that "multiple-case study approaches are generally considered to be more robust" (p. 46) and they should be preferred against single case studies.

3.3. Sampling

For the sampling of the cases companies that would fit this study had to be identified. According to Yin (1994) the cases should be selected through different criteria. The following criteria were used to identify potential companies of interest.

1. **New Zealand based cheese supply chain member**

As this study wants to explore the sustainability efforts of the cheese supply chain in New Zealand, the cases had to be located in New Zealand. As the focus of this study is

limited due to time and financial restraints, the most influential supply chain members were selected to show different perspectives. Therefore the potential companies had to be milk suppliers, cheese manufacturers or distributors of cheese, or companies that vertically integrated these parts as these are the key supply chain members. The focus on the supply chain, instead of similar individual companies has increased in the literature (Carter & Easton, 2011). This allows seeing differences of sustainability practices within the supply chain, and enables the researcher to identify critical issues.

2. Pro-activeness towards sustainability

The initial proposal was to identify companies based on environmental or social certification to only include companies who adapted sustainable practices, which was also done in the case study of Pagell & Wu (2009). A brief research of potential companies showed that only large enterprises could be identified. Additionally all smaller enterprises lacked of defined measurements of environmental and/or social performance or did not even mention sustainability efforts on their website. Furthermore, the risk of falling for 'greenwashing' through marketing was too high (Preus, 2005). Pagell & Wu (2009) already noticed these specific problems of identification in various industries. As pro-activeness is key in the development of sustainable practices, it was chosen to identify companies, who are pro-actively engaging the topic sustainability, which was determined in the first telephone contact with the potential interview partner, who had to be responsible or have experience for the coordination of sustainability practices; the so called principle informant (Voss et al., 2002). This was a feasible approach as the industry has only very few large enterprises and most supply chain members are small enterprises. Sustainability literature proposed that "firm size may impact sustainable activities and outcomes. There is evidence suggesting that adoption of sustainable practices is more likely at larger firms" (Pagell & Wu, 2009, p. 42). Conversely, "small firms can potentially create competitive niches via disruptive innovations in more sustainable product design or business models" (Sharma & Henriques, 2005, p. 175). Therefore different sized enterprises were used in the case study to assess this effect.

3.4. Selection of Cases

The selection of the cases has to be driven by theory and they must be able to answer the research question of the study (Yin, 2003). In a multiple case study the chosen cases should have the ability to generate similar results or "contrasting results but for predictable

reasons" (Yin, 2003, p. 47), which is called the replication logic. Therefore, the selected companies were all located in New Zealand and are representatives of the already mentioned supply chain parts or companies, who integrated them vertically, while they differ significantly in size. The level of vertical integration was divided in three categories based on the simplified assumption that a high vertical integration includes milk supplying, cheese manufacturing and distribution. A medium level of vertical integration showed only two of these characteristics and hence one of those was considered a low level. The companies were further categories by the company size to be able to highlight possible contrasts between SME and large enterprises. The official definition of New Zealand's Ministry of Business, Innovation and Employment (2011, p.3) is based on the number of employees, were all companies with less than 20 employees are seen as small or medium sized enterprises. The category market describes where products of the companies are sold.

For the identification of possible companies relevant homepages and newspapers were studied to create an overview of the existing companies. The strategy was to contact the companies via a standardised email first, which informed over the research project, the required time and the relevance and value of the research (Voss et al., 2002). It also provided contact details of the researcher and the supervisor in case more information was required. Additionally, contact details of the Human Ethics Committee were given in case of complaints or ethical concerns. In case of a response, the potential interview partner was called and further information about the interviews process was exchanged.

The distributors and cheese makers were contacted first, as they could help to connect with other relevant supply chain members, which can be seen as a snowball method. Through member list of the New Zealand Specialist Cheesemaker Association potential companies were identified. Due to a low response rate, the companies were called one week after the initial email. Smaller companies were able to provide the right contact person most of the time right away, while bigger companies had to coordinate the request. The additional indirect approach to contact milk suppliers through relevant social media groups did not lead to any responses. In the end the strategy worked out and the cheese makers provided contact to potential milk suppliers. The initial list contained 25 potential companies, while in the end not all companies fitted in this study and other companies were added in the research process. The integration of Orange in this case study was chosen as they are indeed not a direct member of the cheese supply, but the company stands exemplarily for other milk powder producer that are integrated in the cheese supply chain in New Zealand (Pearce, n.d.). In

addition the company showed great potential for contributions to the research as they show a superior pro-activeness towards sustainability in their practices. The right number of cases in a multiple case study is a frequently discussed topic. Yins (1994) suggest not focusing on a fixed number, but rather collect data until the point of saturation. Contrary to that Eisenhardt (1989) stated that seven cases are the maximum amount that can be mentally processed by one person. To be representative the selected cases were typical companies with a wide variation of all parts of the supply chain, which underlines the holistic aim of this study. The following seven companies in Table 4 were chosen as cases, as this research reached near or the saturation point and the volume of collected data reached the limit of processing within the time and length restrictions of this study (Voss et al, 2002). The amount of cases also fits the position of Eisenhardt (1989).

Company	**Description**	**Level of vertical integration**	**Size (employees)**	**Market**
Yellow	Multinational Dairy Co-operative	High	Large (16,000)	international
Blue	Artisan Cheese Company	High	7	national
Red	Artisan Cheese Company	High	0	regional
Green	Artisan Cheese Company	Medium	14	national
Orange	Multinational Dairy Company	Low	Large (340)	International
Cyan	Dairy Farmer	Low	130-600	international
Violet	Cheese Wholesaler/ Retailer	Low	6	national

Table 4: The Case Study organisations in this research

3.5. Data Collection

Before the collection of primary and secondary data a literature review was conducted to gain deeper understanding of the already existing knowledge and to assist in the development of the probe questions, which can improve the richness of collected data and the subsequent analysis (Perry, 1998).

3.5.1. Reviewed Literature

The initial search for relevant literature was conducted through Google Scholar, a web based search engines for scholarly literature, which combines multiple databases. The key words were "sustainable", "cheese", "New Zealand" and "supply chain" and various variations and combinations of these, which lead to an extensive range of applicable literature. After scanning the results, relevant articles were saved and analysed. Especially literature reviews to the topic sustainable supply chain management supplied essential information through citied studies. Based on the newness of SSCM (Carter & Rogers, 2008; Seuring & Müller) and the little research about the cheese supply chain, the keywords were extended to "food", "dairy" and "agricultural" in various forms, which provided further relevant articles through studies about the food industry.

3.5.2. Empirical Data Collection

The data collection in cases studies follows the principle of "triangulation, the use and combination of different methods to study the same phenomenon" (Voss et al., 2002, p. 206). For this study, interviews and content analysis of the relevant websites is used, which increases the reliability through the multiple sources of data (Yin, 1994).

Interviews are widely used for data gathering in qualitative research in management, especially in case studies they are "one of the most important sources" (Yin, 1994, p.84), as they can provide rich data and uncover tacit knowledge (Cavana et al., 2001; Myers, 2009). Hammersley (1992) justified the reliability of qualitative data as they "document the world from the point of view of the people studied… rather than presenting it from the perspective of the researcher" (p. 45). Interviews can range from unstructured to structured, while the

semi- structured interviews are most commonly used in management research (Myers, 2009). Semi-structured interviews integrate existing knowledge in the questions and leave room for the explorative nature of this study. The semi-structure gives the opportunity to create a tighter focus but still leave "flexibility to focus on what was unique at each of the companies" (Pagell & Wu, 2009, p.42), which showed the best fit to this study.

The initial contact email aimed for interview partners, which were industry experts of dairy supply chain with experience around sustainability practices and challenges in the supply chain. This was left broad, as the relevant companies varied in size and structure and specific job titles could not be identified. The final participants were the business owners or in middle to top management positions with responsibility for sustainability or environmental related practices. Voss et al. (2002) stated that "the use of tape recording can contribute towards reduction of observer bias, especially if the evidence is presented verbatim rather than summarised" (p. 210), which leads to increased data validity and accuracy. Therefore all interviews were taped 'digitally' with the consent of the participants and transcribed as soon as possible to enable the research to integrate any new information into the next interviews. Additionally field notes were taken and added to the transcription. The bias through a single interviewer has to be considered, but other additional researchers were not applicable due to the nature of a master thesis. This research was approved by Human Ethics Committee of the University of Canterbury and executed within their guidelines. The data will be stored securely for five year and then deleted.

All interviews were conducted between December 2015 and January 2016 and lasted mostly between 60 and 90 minutes with XX exceptions that lasted longer to further clarify open questions. 6/7 of the interviews were face-to-face it gives the opportunity to clarify doubts, rephrase questions and adapt them to the situation as well as ensuring the understanding of responses through repeating ore rephrasing (Cavane et al., 2001). One interview was conducted over the video call service Skype by the reason of the large geographical distance between researcher and interview partner. With the visit of the plant, it was possible to compare the spoken word with reality and gave the opportunity for field notes and further questions. Due to the limited time and financial constraints, only one interview with each expert was realizable. A transcript of the interview was sent out to the participants to ensure accuracy of the content and possible confidential information could be obliterated. As this research will be publically available through the University of Canterbury Library, the identities of the interview partners are held anonymous to avoid possible negative

consequences. To assure the anonymity of the participants from the beginning of the research process, each participant was given a number and the recordings and transcripts were stored on two USB sticks, which could only be accessed by the researcher and the supervisor.

Secondary data was gathered through the web sites of the selected companies and other publically available data on the internet to fill remaining information gaps and validate interview statements. The sources of the secondary data were considered to ensure validity and reliability.

3.6. Data Analysis

"Data analysis consists of examining, categorizing, tabulating or otherwise recombining the evidence to address the initial propositions of a study" (Yin, 1994, p. 102). Cavana et al. (2001) highlight the need of categorization in case studies as it support to "identify the underlying themes, insights and relationships within the phenomena being researched" (p. 169).

3.6.1. Strategy

Yin (2004) states that the analytical strategy should priorities the focus of the analysis and the reasoning behind it, which could include "relying on theoretical propositions, setting up a framework based on rival explanations, and developing case descriptions" (p.109). As the design and the objectives of this case study are based on the exploration of the sustainability of the cheese supply chain and the theories of the literature review, the strategy was to rely on theoretical propositions as they shaped the data collection and identify matching patterns to answer the research questions (Yin, 1994). External validity is "knowing whether a study's findings are generalizable beyond the immediate case study" (Yin, 1994, p. 35). Through integration of different types of supply chain actors in the case study the external validity is increase and to even further enhance the external validity of this case study cross case synthesis was used. Different types of data and patterns were compared and contrasted to enhance the strength of the findings and reveal conflicting data.

3.6.2. Coding

The coding was initiated after the data collection, to reduce possible researcher bias (Miles & Huberman, 1994). The coding was a multistep iterative process, which was based on different categories to identify and separate environmental and social performance enhancing practices within company and the supply chain. The scheme was extended within the coding process as different behaviours, views and practices arouse. Overall the ten main codes were identified with multiple sub-codes to further categorise the data and allow easier matching between the cases. The data reduction and data management within the case analysis allowed making sense of the information and the cross case analysis revealed patterns that are further discussed in the following chapter (Miles & Huberman, 1994).

4. Analysis

The following chapter the underlying data is reduced to give insights of the sustainability efforts of the cheese supply chain members as well as develop and understanding of the circumstances of sustainability efforts in the supply chain. The first part describes the different views on sustainability, which is followed by the environmental and social efforts that are undertaken, and views on the economical outcomes. In the last part of the analysis insights of the circumstances, relationships and sustainability efforts with other cheese supply chain members are given.

4.1. General sustainability measures

From the observed cases only Yellow, Orange and Cyan published their strategy to enhance the sustainability through their website, which are all categorized similar to the triple bottom line. Five companies mention sustainability efforts on their website, which vary significantly in detailedness.

The concerns of the practitioners towards sustainability challenges in the cheese supply chain are diverse. The practitioners recognize the impact of their production through emissions, water-and land use as well as animal welfare issues. On the other hand the

restrictions through legislation and the lack of training and education around sustainability are seen as prohibitive towards sustainability efforts.

Six of the practitioners view the current legislation rather negative as they view the laws and regulations that concern environmental protection to be behind of the growth of the industry, while they do only mention issues with animal welfare on the social side of sustainability. Two experts see the laws as a bottom standard (pers. com. Orange, Cyan), which is very achievable even as a medium performer (per. Com., Cyan, 2016). Additionally the enforcement of laws and regulations are seen critical, which lead to unfair conditions (pers. com. Yellow, 2016) and too mild punishment in case of animal mistreatment (per. com. Red, 2016). On the other hand the current legislation is seen as prohibitive towards sustainability as they are created to meet export regulations (per. com. Green, 2016), which also do not differentiate enough between small and large enterprises (per. com. Red & Blue, 2016). The general disposition is rather negative as laws and regulations are not introduced with a holistic approach to enhance sustainability but rather to as a reaction of recent scandals, which create new problems and conflicting situations for the businesses (pers. com. Orange, Cyan, 2016). Three experts mention that they expect the legislation to change in near future, which is seen positive. Yellow and Orange showed active engagement in lobbying for new laws and regulations as well as submissions for "particular aspects of legislation" (pers. com. Yellow, 2016).

All companies report to be members of industry relevant associations, for example the Dairy NZ, New Zealand Specialist Cheesemakers Association or regional business associations. Yellow, Orange and Cyan also have relationships to universities that are utilized to engage sustainability topics. The same companies also report to work with NGOs and the Department of Conservation.

The pressure towards sustainable corporate actions can be divided into internal and external drivers. Five of the seven practitioners see the biggest external group in the customers and consumers, both private and commercial, who show a growing awareness around this topic and request local or even organic production. While the government is also seen as a negative driver as it is too 'business orientated' (pers. com. Violet, 2015). The responses to the internal drivers can be divided in two groups. Six of seven see the owner or the management as a very influential driver towards more sustainable practices, but five of seven practitioners also recognize that staff is engaged in these processes through suggestions and monitoring of

sustainable behaviour and practices. Interestingly non-governmental organisations were not named as drivers, which follows the observations of Seuring & Müller's Delphi Study (2008b).

In the literature certifications are seen as a tool to provide transparency about the sustainability of the company for costumers and consumers. Only three of the analysed cases hold accredited sustainability standards, for example the ISO14001 (environmental management system), ISO 65 accredited dairy farm assurance system, ISO 9001 (quality management system). The Orange expert (2016) commented "…we can prove that our farms are as good as we say they are which is quite important". The uncertified companies provided various reasons against certifications. Four companies mentioned the high costs are prohibitive, while two other companies did not see an economic benefit from it as the costumers do not request accredited certifications.

4.2. Sustainability efforts within company

In the following section the environmental efforts within the company are analysed, which is further divided in the two categories milk supplying and cheese manufacturing & distribution as the scope and the methods vary significantly. Efforts with the same topic were matched in both parts to provide a better overview and allow comparison.

4.2.1. Environmental efforts in the milk production

The environmental efforts of the five cases, which produce milk, are mainly concerning the on farm practices but also include other process before the cheese manufacturing. All milk suppliers have implemented recycling or reuse management practices for their different waste streams. Cyanhas a recycling policy and minimize their future waste through controlling the material, which is brought on the farms (pers. com, Cyan, 2016). They work together with recycling companies that provide a holistic recycling scheme. Orange's recycling program was established four years ago and 95% of their waste is now recycled, which is managed by the master guardian police on the site (pers. com., Orange, 2016). Yellow has implemented a program that also includes the recycling of tanker tyres into rubber and metal.

As irrigation is needed to optimize pasture growth, active management of the irrigation systems and the regular maintenance of them are stated by Yellow and Cyan. Cyanis using variable rate irrigation systems, which are adapted to the mapped soils and the fertilizer input (pers. com. Cyan, 2016). Red does not irrigate their paddocks and subsidizes the pasture through hey and pellets. Blue is "getting away" (pers. com. Blue) from irrigation to reduce nutrient leaching.

The reduction of nutrient run off into water streams is vital as it can be the cause for algal blooms that starve waterways of oxygen and thereby damage the ecosystem. Cyan and Yellow are using the "Overseer farm modelling tool to manage the application of nutrients, which calculates nutrient budgets, and estimates the quantity of fertiliser to apply to maximise on-farm productivity, which in case of dairy is to maximise pasture growth, while minimising nutrient run-off into streams" (Cyan, caring for the environmentWWW, 2016). The software is part of the Sustainable Dairying Water Accord and was introduced three years ago, with a participation of 79% in 2015 (pers. com. Yellow, 2016). It includes leaching risk calculations, nitrogen conversion efficiency and performance comparison with other farmers in the region (Yellow annual review, 2015). Blue and RED also actively manage their fertilizing activities and do not use synthetic phosphates or nitrates. Instead they replaced conventional fertilizer trough natural rocks such as Apia?, reactive rock and dolomite (pers. com. Blue, 2015). All cases, which involve farming activities, have implemented riparian management through the plantation of native vegetation on water streams, which acts as barrier for nutrient leaching and also provides shade to decrease evaporation of fresh water. Furthermore it limits the accessibility for livestock to waterways and reduces stream sedimentation through bank erosion. Another positive side effect is the creation of habitat for animals above and below water surface (pers. com. Yellow, 2015). An additional effort to prevent pollution of waterways is the fencing of them, as well as providing bridges and culverts for cattle crossing waterways, which was mentioned by Yellow, Cyan, and Blue.

Blue is avoiding herbicides and pesticides on-farm to enhance the biodiversity, which is further supported through an enriched pasture mix with different grass species. Red and Blue both are trying to go back to native grass species as they show a better adoption to the climate and therefore faster regeneration with less irrigation (pers. com. Red, Blue, 2015). Cyan is also running a program to re-vegetate non-productive areas of land with native

species to increase biodiversity through new habitats (Cyan, Caring for the Environment, 2016).

Cyan, Red and Blue are actively managing their pasture through the seeding or conservation of different grass species that adopt better to different soil types, locations, stocking rates, and climate, so faster regeneration with less irrigation is possible and a nutrient rich pasture is provided for the animals. For example clover is a nitrogen fixing plant that reduces synthetic fertilizer usage (pers. com. Cyan, 2016). Blue also put up bumblebee hives to support the pollination of red clover and further increase biodiversity (pers. com. Blue, 2015).

The use of coal for the production of thermal energy in the milk powder production is unavoidable, especially on the South Island, where no other comparable energy sources are available. Yellow and Orange both use New Zealand coal, while the Orange experts pointed out that they test the coal to fulfil their standards to be able to use only "the best coal" to minimize discharges.

The transportation of the milk between the farms and the cheese manufacturing site has to be coordinated to minimize the number of tankers and the travelled distance. Yellow additionally uses the rail for milk collection. For a further optimization, Yellow implemented the vehicle routing and collection software Genesis, which improved the transport efficiency by 11% and resulted in 99.6% collection in time. Recorded data is furthermore used to train drivers and to comply with the maximum shift length.

4.2.2. Environmental efforts in Cheese Manufacturing & Distribution

The following analysis is based on environmental practices of the six companies, who produce cheese and distribute it.

All cheese manufacturers and distributors are actively recycling their waste, which is mainly plastic, paper and cardboard, while two rural companies are transporting their waste themselves to transfer stations. Yellow's recycling program achieved to recycle 94% of the solid waste and is also working with a fertilizer company to turn their food waste into compost, which is further used on farms. To enhance the recycling of packaging through the consumer, Yellow implemented a trail program with two portable consumer recycling stations to collected selected packaging materials, which will be further expanded if it proves

to be a success. Additionally Yellow increases their recycling through the collection of the waste of their Milk for Schools Project. Violet stated that they use the recycling bags of the local council as they are only a quarter of the price of normal rubbish bags. The used polybins, which are used for importing and transportation of cheese, are given to an other local food business, where they are reused. The biggest part of waste in the cheese production is the left over whey, which is recycled by every cheese manufacturer. Red and Green supply their whey to a local pig farm, while Blue is using a "very small portion" (pers. com. Blue) to irrigate the paddocks, while the rest is fed back to the cows, which increases the milk yield. As waste is not only produced through current assets but also through fixed assets, the regular maintenance of machines mentioned by all cheese manufacturers to prevent waste. Furthermore the two small cheese manufactures use second hand equipment, which reduces overall waste and also has price advantages compared to new machinery .Violet and Blue are using grease proof paper for consumer sales to reduce the plastic waste, while the others use plastic wrapping.

The reuse or recycling of water is adopted by all cheese manufacturers. Green is reusing the parts of the chemical cleaning water to reduce effluent and chemical use. Additionally the effluent water is used to irrigate the garden of the manufacturing site (pers. com. Green, 2016). Yellow reports 5.6% of fresh water reuse in 2014, while the overall water use per tonne decreased by 2%. (Water efficiencyWW) Orange is reusing water from cooling towers and is irrigating the paddocks of a local farm after a filter process. Additionally waste water field, which were recently extended to match the expanded production, are used when irrigation on the local farm is not needed.

As cheese is a perishable product the cold chain has to be maintained, which requires the use of refrigeration gear. Green replaced the old one and invested in a new, qualitative refrigeration system, which was supplied from a local company, to be able to use more environmental gases as well as keep running costs relatively low due to reduced energy consumption and the ability to repair the system in case of failure (pers. com. Green, 2016).

Yellow runs an energy efficiency program, including a "hit team" that searches actively for inefficiencies in the plant (pers. com. Yellow, 2015), which reduced the manufacturing energy consumption by 16.8% since 2003. This included programs to improve boiler efficiency and reliability, and the implementation of heat recovery loops. Furthermore they replaced traditional lightning technologies through LED lightning technology in their

dry stores, cold stores, commercial buildings and process areas. 22% of the energy is supplied through co-generation (combined heat and power) to produce electricity and usable hot water.

Violet are only importing only cheese types that are not produced in the same quality in New Zealand to reduce overall transportation and also refuse to ship cheese that was produced in the North Island to North Island customers and provide alternative retailer contacts (pers. com. Violet, 2015).

Yellow ships the exported cheese in containers via sea, while airfreight is "very, very rare" (pers. com. Yellow, 2015) option.

4.3. Social Efforts

4.3.1. Animal Welfare

As animal welfare is an ethical consideration, it is integrated in the social stewardship part of the analysis. All participants show are recognizing the importance and necessity to maintain a high standard of animal welfare not only from a moral standpoint but also as it increases performance of the animals in terms of milk quality and quantity as well as the minimization of the risk to loss of reputation. To further enhance the animal welfare, different efforts are mentioned in the data. Cyan highlights the importance of staff training for animal handling to reduce the chance of mistreatment and optimal performance. Additionally they are using an individual body condition scoring scheme for every animal to recognize possible sickness as soon as possible as well as keeping a record of animal related data to discover failures (pers. com. Cyan, 2016). Instead of regular chemical drenching to kill parasites, Reds is using natural alternatives first to reduce the use of chemicals and also reduce the waste of valuable milk (pers. com. Red, 2015). They are also following a rescue breeding philosophy to maintain and improve genetic diversity of the Rawhiti goat. Blue is using homeopathic remedies to treat illness if possible and animal welfare is not as risk. As bobby calves are a by-product of dairy farming, the treatment and handling of same is also of importance to the cow keeping companies. Cyanare using the closest abattoirs and processors to the farming operation to reduce transportation time and stress for the animals. Blue is leaving calves longer with their mothers than usual and uses Manuka chips for the bedding, which plummeted the calve death to zero (pers. com. Blue, 2015).

4.3.2. Social Efforts within the Company

All cases recognize the social performance to be part as of their sustainability efforts, and in six cases they recognize staff as key for general performance of the company, while the seventh business has no staff. Therefore Red is excluded from all staff-related efforts in this section.

The six companies all provide training programs for their employees at all levels, which range from induction to the workplace over Health and Safety training to upskilling professional development to enhance the knowledge (pers. com. Cyan), which is seen as necessary as three companies mentioned explicitly that the training and skill level of new employees is often insufficient.

The creation of a positive work environment for increased social performance is adopted by all six staff keeping companies through various methods. Yellow introduced policies and programs, such as their leadership and engagement initiatives, that fostered a feedback culture, which resulted in the communication, which was designed to increase health, safety and wellbeing of the employees and therefore the social performance of the company through . Additionally Yellow is providing a confidential hotline service through an independent organisation to identify and resolve discrimination, bullying, harassment or victimisation. The three small participating enterprises of this case study are all providing free lunch for their staff. Cyan introduced cloud based apps for their Health and Safety program amongst others to simplify and reduce paperwork after the request from the employees. The workplace is improved to contribute to a positive work environment by 3 cases through different approaches, for example health nurse, greening the workplace and modern facilities.

A good work-life balance for the employees is a key point for the social performance, which was reported by all companies. This is done through various wellness and wellbeing programs as well as through flexible work times. Cyan is tracking the hours of their employees constantly and an alert flags if overtime is too high, which is especially a problem in the agricultural peak season such as calving.

All the participating cases are paying at least minimum wage or more to create a good income standard. The Blue interviewee stated “…if you pay peanuts, you get monkeys”. Cyan is also providing housing for their farm workers as a part of the salary, which is

common in New Zealand. Yellow provides an optional comprehensive scheme around pension and insurances for their employees.

Three companies mentioned that they actively work on talent development and provide incentives for extraordinary work performance, while bonus payments were only paid at management level. For example Yellow is awarding the "tanker operator of the year" for the best tanker drivers to encourage best driving behaviours. Additionally scholarships for further education or leadership programs are provided to foster own future management and leaders.

Food Safety Programs, which contain Quality Management guidelines as well, are in introduced in all companies as they are compulsory by New Zealand legislation for every food handling or producing business. Four companies also report extra testing of their ingredients and products, to ensure quality and safety of their products and reduce the risk of losing cheese batches and legal consequences.

4.3.3. Social Efforts towards the Society

The social performance of a company is not a solely company internal matter, the effort that are undertaken to help, maintain or support the society have to be addressed as well, which is done in the following section.

All companies recognize that efforts to support the society are necessary and increase the social performance of them. Overall the most efforts are long-term and support the local communities through various ways. Especially the employment of local workforce is helping the communities and also able to sustain schools and sport teams in the rural areas (pers. com. Cyan, Green). Four of the companies are actively engaged in sponsorships of events, projects or sport teams or provide assets and locations for local events. Yellow is funding a program that aims to enhance local communities, environment or safety. Orange and Cyan support their local rescue forces. Three companies are supporting schools with free milk and breakfast to provide nutrient food for the pupils and support underprivileged kids, which is also used to alter behaviour and create brand awareness (per. com. Yellow, 2016). Systematic recycling of the used packaging was also introduced to increase the sustainability of the program. Various monetary, food and voucher donations are made by four of the companies towards charities, artist, political parties, and food banks. Two of the seven companies are

able to provide university scholarships for students. Cyan's scholarship application process also includes a research project about farm related sustainability efforts, which is aligned with their sustainability principles and aims to promote them. Two of the interviewees also noted that efforts, which are limited due to their size are only undertaken if there is a local or personal connection to the occasion. Orange and Yellow are also working together with local Māori tribes in business related issues through their cultural advisory groups to reduce frictions between the native tribes and the land users.

An overview of selected practices that are implemented within the companies is given in Table 5.

Practice	**Number in Sample Engaged in Practice**	Yellow	Blue	Red	Green	Orange	Cyan	Violet
Environmental Efforts								
Recycling of waste	7	Y	Y	Y	Y	Y	Y	Y
Reutilization of waste	5	Y	Y	N	Y	Y	N	Y
Irrigation management	4	Y	Y	N	n/a	n/a	Y	n/a
Pasture management	3	N	Y	Y	n/a	n/a	Y	n/a
Fertilizer Management	4	Y	Y	Y	n/a	n/a	Y	n/a
Riparian Management	4	Y	Y	n/a	n/a	n/a	Y	n/a
Animal welfare enhancements	4	Y	Y	Y	n/a	n/a	Y	n/a
Replacement of old infrastructure	4	Y	Y	N	Y	N	Y	N
Regular Maintenance	5	Y	Y	N	Y	Y	Y	n/a
Social efforts within the company								
Staff training	6	Y	Y	n/a	Y	Y	Y	Y
Investment in work environment	6	Y	Y	n/a	Y	Y	Y	Y
Attention to Work life balance	6	Y	Y	n/a	Y	Y	Y	Y
Talent development program	3	Y	Y	n/a	N	Y	N	N
Income standards	6	Y	Y	n/a	Y	Y	Y	Y
Social efforts towards society								

Community support	7	Y	Y	Y	Y	Y	Y	Y
Sponsorship	4	Y	N	N	Y	Y	Y	N
Free Milk/Breakfast for schools	3	Y	Y	N	Y	N	N	N
University scholarships	2	Y	N	N	N	Y	N	N
Cultural advisory group	2	Y	N	N	N	Y	N	N
Y=engagement in the activity; N= no engagement in the activity; n/a= not applicable								

Table 5: Cross case comparison of selected company internal sustainability efforts

4.4. Economic Outcomes

The undertaken efforts to increase the environmental or social performance also impact the economic performance of ta company. All companies recognize positive outcomes of their efforts, while only two companies also mention a negative impact of the economic performance. Four positive outcomes of the efforts can be identified in the ground laying data.

1. **Cost reduction and savings**

   Six companies are able to reduce the costs of processing and material through more efficient use of their resources, such as water and electricity. Additionally three companies report cost saving through lower turnover caused by their social efforts. Two companies were also able to reduce costs, which were caused by new laws and regulations.

2. **Increased Reputation and Image**

   All cases recognize that their social and environmental engagement create a better reputation and image of the company. Five cases report that their efforts are appealing costumers through their practices, while two companies even recognize it attracts new staff.

3. **Increased performance**

   A growth in performance through improved social and environmental performance was acknowledged by all companies. Especially the companies with employees see an improved performance of their staff, while the farming companies also see a higher

productivity of their animal staff. Three companies also note that new technologies, which were introduced to be more sustainable, aided their increased performance

4. **Increased Quality**

   Overall six cases see that the quality level of their products is improved through the undertaken efforts, especially the animal welfare improvements impacted in a higher quality of the milk.

4.5. Restrictions towards more Sustainability

Companies that want to be more sustainable also face restrictions, which can be internal as well as external. Six of seven companies report that the initial investment costs for more environmental friendly projects are prohibiting their behaviour or planned projects as economically positive outcomes are questionable. Three companies report that infrastructure is restricting their sustainable behaviour. Yellow noted that inherited manufacturing sites are not up to modern efficiency standards. The external infrastructure was criticized by two participants, where the non-existent water circuit and waste disposal or recycling possibilities are mentioned, which are caused by the rural location, which also forces employees to travel by car as public transport is not available. The energy use is also restricted through the infrastructure, for example the power supply system is so volatile that modern energy saving lamps cannot be used or the only available option for high temperature applications is coal, which is known not to be climate friendly energy source. Cyan also reports that farm infrastructure is not ideal for the animal welfare, as paddocks were shaped by irrigation, which caused a loss of shade and cover for animals (pers. com. Cyan, 2016).

Green and Red also see current legislation and regulations as preventing sustainable behaviour, for example through unnecessary cooling or use of certain chemicals for cleaning. The use of biodegradable dish soap for cleaning is not possible any more due to health and safety laws, which only allow certified chemicals (pers. com., Red, 2015). Cyan and Blue also mention that no premium is paid by Yellow as an incentive for proactive sustainability efforts that are undertaken. Yellow only pays a premium for organic milk production. Blue and Green also see a problem in the behaviour of the consumers, who request plastic pre-packed cheese pieces in supermarkets. Yellow and Green also mention a slow progress in research, for example for reduced emissions of dairy cows or biodegradable packaging. Four of the six staff keeping companies also mentioned that new staff is often untrained and that

they lack of experienced available staff, which is especially the case for professional cheese makers. Another restriction that influences the sustainability effort is the measurement of the efficiency of the sustainability efforts that enables to monitor and rate or benchmark them. The three biggest companies report that they are taking measures, but they also note the fact that many outcomes are hard to quantify and also to monetize.

4.6. Discontinued Projects

As the literature lacked of insights about negative sustainability efforts, the question of discontinued projects arouse. Five companies reported that they did not discontinue any projects around sustainability, but two of them reported that readjustments had to be made and also progress was slower than anticipated, for example participation in the fertilizer management program was lower than expected because of the involved amount of effort to maintain the record of fertilizer activities (pers. com. Yellow, 2015). Two companies reported that they discontinued environmental efforts, for example a composting project for leftover cheese and fertilizing with an organic foliar feeder.

4.7. Future Plans

Three areas of future plans for more environmental friendly practices were identified and matched. Four companies are planning to optimize their waste management, especially through the use of different packaging materials. Green stated that they are already testing various biodegradable films, but could not find any that fits the shelf life of the cheese (pers. com, Green, 2016), while Yellow's "Recycle Lab" program is researching reuse and recycling of packaging materials.

Second the future enhancement of nutrient and fertilizer management is reported by three milk supplier, for example they want to increase their efforts in the optimization of pasture mixes to reduce irrigation, use of fertilizer and even reduced gas emission of dairy cows. Cyan is also researching fungal and bacterial activity in the soil and their possible utilization to decrease synthetic fertilizer usage (pers. com. Cyan, 2016). Yellow is also pushing their ability to measure specific on farm water use to be able to control and optimize the water consumption.

Thirdly the all cases have plans to reduce emissions that are caused through their business. The on farm activities include research for supplement feeds, vaccines, and breeding programs to reduce the dairy cattle emissions and increase robustness of the animals, as well as breeding for a beef and dairy cow breed. Processors of milk and cheese are also planning to decrease emission through the use of renewable energies, for example biomass, solar, wind turbines. Additionally three companies have future plans to increase energy efficiency projects for example through heat recovery in processing and cooling facilities.

All companies stated that they wanted to continue their engagement for social performance of their business, but only two companies reported concrete future plans. Cyan wants to further research how animal welfare can be increased through different farming techniques and infrastructure improvements. Orange is reengaging its shuttle bus idea to provide transfer for employees to work, which also decreases the amount of used cars for transportation and therefore the overall emissions.

4.8. Supply Chain related sustainability efforts

All of the companies are not able to source all their needs in New Zealand. However all cheese makers are getting supplied through local dairy farms and source their rennet and salt from two different New Zealand companies, so local chains are used to minimize transport and ensure freshness of the products, which is favoured by all cases. The packaging materials are sourced from New Zealand, the USA and China. The cheesemakers also note that cheese making equipment has to be imported from Europe and the United States of America, as local production is not available or very expensive. Yellow and Cyan are using a Palm Kernel expeller as supplement feeding, which is only sourced from a certified sustainable palm plantation to ensure environmental and social performance of the supplier.

For the implementation of supply chain wide sustainability efforts, the relationship to suppliers is a key element that has to be considered. Especially the relationship to the probably most important ingredient supplier, the dairy farmers, is seen as a close interaction with regular visits by the three companies that source their milk from other organizations than their own. The biggest two, Yellow and Orange, also provide support and advices to enhance the sustainability of farming through training courses, farm advisors, etc. Yellow also provides financial aid to their dairy milk suppliers through group buying benefits as well as

financial consulting. The four small companies of this case study report that they have a personal relationship to several of their suppliers, while two of also three also mention problems in building a connection as the distance between the organizations is far and the purchased quantities are relatively low.

The goal of sustainability can only be reached if the whole supply chain is making efforts towards an increased social, environmental and economic performance, therefore the suppliers have to be selected carefully (Pagell & Wu, 2009). Only two companies, the largest enterprises as well, have a formal supplier selection process, which includes sustainability measures and guidelines, while four others report of an informal way of supplier selection. The informal selection is reasoned with the prior interviews, good reputation of the suppliers or personal connections. Additionally the obligatory "extra paperwork" (pers. com. Violet) is seen as hindrance to business.

The collaboration with suppliers in sustainability efforts is necessary to enhance effects in the supply chain, which is done in four cases of this study through various methods, for example packaging development, fertilizer & water management. Overall all companies have food safety guidelines within their supply chain in place, which is also a legal requirement as a food grade product processing company. Quality management is also adopted by six companies, which is seen as paramount criteria for their product, while four companies are even audited by external companies for quality. Only Yellow and Orange have a measurement system for their milk supplier, which is linked to sustainability. Yellow is basically measuring if legal requirements are met and if their projects, which are supported through advisors and training courses, are adopted. Orange took an extra step and provides a voluntary, holistic sustainability in-house standard for their milk suppliers, which includes the four pillars environment, animal health welfare, milk quality and social responsibility. Dairy farmers have to implement the best practice standards of the program, which are above legal requirements. Orange actively guides the farmers through advisors and online accessible handbooks. Farmers are audited and after successful implementation are certified by their in house standard, a dairy farm assurance system that is accredited by ISO 65. The in-house standard has three different levels, which can be achieved over time and are also related to the amount of the premium for the milk. Additionally the farmers earn the right to publically show their achievement with an official sign on the gate of the farm. This program was also accepted as farm environment plan by the regional council Environment Canterbury.

Four companies are reporting that they are audited for quality, food and safety standards of the Woolworth Quality Assurance program by external audit firms to be able to supply New Zealand supermarkets, which do not only ensure compliance with quality but also legal requirements. They also include audit question that concern environmental and social issues. Additionally traceability of the products has to be guaranteed to be able to recall products in case of a problem.

The table 6 provides an overview of the mentioned practices that were already linked to sustainable supply chain management.

Practice	**Number in Sample Engaged in Practice**	Yellow	Blue	Red	Green	Orange	Cyan	Violet
Formal supplier selection	2	Y	N	N	N	Y	N	N
Collaborate with suppliers	4	Y	N	N	Y	Y	Y	N
Quality management	6	Y	Y	N	Y	Y	Y	Y
Measurement systems linked to sustainability	2	Y	N	N	N	Y	N	N
Y=engagement in the activity; N= no engagement in the activity								

Table 6: Cross case comparison of sustainable supply chain management practices

5. Findings & Discussion

In the following chapter, the findings from the analysis are presented and discussed in order to provide insights into the sustainability efforts of the cheese supply chain. Therefore, this chapter is divided into three parts to classify the efforts according to the triple bottom line; illustrate the practical experience in comparison with the theory of sustainable supply chain management; and discuss the implications that emerge from this chapter. Furthermore the limitations of this case study and future research opportunities are presented.

5.1. Classification of practices in the TBL

The analysis shows the various ways in which different supply chain members try to enhance their sustainability through basic practices as well as advanced ways to enhance the

environmental protection and take on their social responsibility. The findings are discussed according to Elkington's triple bottom line (1997) and how they alter the environmental or social performance and contribute to the economic performance.

5.1.1. Environmental Practices

The farm activities have considerable interaction effects, which can reduce the environmental impacts of the milk production. As irrigation is a greatly criticized topic, especially in New Zealand's dairy farming, the efforts of the affected companies vary from the non-use of irrigation to optimized irrigation systems. The abandonment of irrigation is only possible if the climate, location and the pasture are optimal, which is not the regular case. If non-irrigation leads to the need of supplement feeding, the problem is only displaced and not solved. Therefore, active and effective irrigation management and regular maintenance of the associated systems have been implemented by the milk suppliers and represent a way to reduce water use and nutrient leaching, which overall reduces water and fertilizer use. In combination with nutrient management the effects are reinforced through the optimization of fertilizer inputs, which can be aided by modern technology such as the software Overseer to adapt to local conditions. As already mentioned in the analysis, the cultivation of native and locally adapted grass species reduces irrigation and fertilizer usage, while these species regenerate faster and also have a positive effect on the milk quality. Additional riparian management reduces nutrient run-off through additional plants at waterways, which also creates a habitat for animals, reduces water evaporation and prevents animals from polluting waterways. To further reduce the pollution by dairy cows, fencing off and bridging waterways and wetlands is a vital step for the preservation of rivers and streams. Overall the efforts on farms lead to a reduction of water and fertilizer use, while the cultivation of locally adapted pasture seed mixes in combination with riparian management reduces nutrient leaching to a minimum, increases biodiversity and effectively reduces running costs that are related to water or fertilizer usage and risks of environmental pollution. Therefore, a holistic approach to farm related practices is able to increase environmental performance as well as reduce future costs and risks of environmental pollution, for example water and land degradation. The optimization of a dairy farm is a process that takes time and also includes numerous financial investments in assets and staff education, but possible future legislation in New Zealand will force farmers to act more sustainable. This is also supported

by the view of the practitioners that the current laws and regulations are behind the industry and changes will follow. Furthermore, these engagements will add to the reputation of a company and the branch and reduce the risk of being affected by farm related environmental scandals if efforts to increase its environmental performance are published (Glen, 2013). Therefore a pro-active engagement in farm related practices is a necessary step to increase the sustainability of the cheese supply chain. This was acknowledged and actively implemented by the best practices program from Orange, an ISO 65 accredited in house standard, which also offers a premium for milk from certified farms to further engage farmers in sustainable thinking and reduce financial restraints through the incentive provided. However, recent scandals show that the above discussed efforts are not implemented by every farmer and still laws and regulations are broken.

Overall, the wide adoption of waste stream recycling in all participating companies, some of them even with recycling rates over 90%, shows that this relatively basic environmental efforts is recognized as important, while a positive financial reward is probably questionable as the only named reward was price reduced garbage bags. Another negative economic impact is created by the lack of public waste collection system in rural New Zealand, which forces rural companies to take their sorted waste to the disposal site themselves, which creates significant losses in time and costs through transportation. The utilization of by-products, such as whey, or waste on the other hand shows innovative thinking and contributes to reducing costs, for example through decreased water or fertilizer use. The cases also highlight that a reduction of waste is possible through controlling the material input that create future waste by the reduction of used materials or the changes of it, for example the replacement of plastic with grease proof paper. The image and reputation of a company is often partially influenced by the environmental efforts and refraining from complying with “basic practices” can damage it seriously, therefore recycling and the reutilization of waste products has the potential to add to the reputation of being sustainable for a company.

The reduction of water use is one aspect to protect the valuable water reserves, which can be aided by the reuse of water instead of flushing it in the effluent system. The named methods in the analysis to reuse water range from non-cost to large investment intensive methods, while those should be based on a grounded investment calculations to investigate if a future financial return is possible. The irrigation of nearby farms with filtered processing water supports a holistic approach towards sustainability and also relieves local waterways, which

are normally used for irrigation. This can become an interesting possibility as the environmental plans of the regional councils now regulate the waterway abstraction of farms (DOC, 2015b). If the water usage is connected to a fixed price, these efforts do not have a positive financial return but are adding to image and reputation of a company.

The biodiversity programs, which are named in the analysis, are definitely increasing the environmental performance through the creation of new habitats and renaturation, while a positive financial effect is questionable due to investment costs in material and plants. A positive effect on the image and reputation of the company can only be achieved if the efforts are published and marketed, which was only adopted once in this case study.

An often criticized point in dairy related products is the high emissions that come along with them. While the largest highest amount of emissions is produced on farm level, also due to the inevitable gas emission through dairy cows and goats, the emissions of the following process steps are still relevant to increase the sustainability of the whole supply chain. The optimization of logistics through software and local chains reduces emissions and also the related running costs.

The replacement of outdated infrastructure through modern, more efficient equipment found a wide adoption in this case study, which shows that the chance of lower running costs and higher efficiency outweigh investment costs in many cases. New technologies are able to increase performance and reduce costs through optimization processes or energy usage while enhancing the environmental performance as well. The bad electrical infrastructure in rural New Zealand is again constraining the freedom of action through inconsistent electricity supply.

The future plans of the studied cases show that the awareness around energy production already exists but the high investment costs are hindering actions to restructure the energy mix. While the replacement of coal in the South Island for the manufacturing of the ingredient milk powder is a major challenge for the future as currently more environmental friendly substitutes are not available.

The mentioned regular maintenance of equipment helps to increase life spawns and reduce inefficiencies through leakage etc. and also reduces the long term waste creation of the company, therefore economic and environmental performance is enhanced.

The creation of an environmental efficiency team, as done by Yellow through their hit team, is an innovative way to tackle inefficiencies, reduce waste and energy losses and also create awareness for sustainability within the company. The utilization of the on-site security for recycling of waste streams is an efficient way to integrate already available staff in the sustainability culture of the company.

5.1.2. Social Practices

The following section is divided in three parts, the animal welfare practices, social practices within the company and towards society.

Animal welfare was not seen only as a moral obligation, but the practitioners also identified positive economical outcomes of a healthy livestock. Early recognition of health problems and corresponding treatment of animals reduces losses of livestock, which was aided proper staff training. The named alternative treatment methods allow the farmers to use the milk of affected animals earlier and therefore a loss of production is minimized. A rich pasture mix was also linked to a higher yield and quality of milk, which adds to the economic performance of holistic acting farmers. The issue of booby calving was recognized, while solutions are not provided yet. Further research in genetics and breeding achieve high performing dairy and meat animals, which is already pursued, is needed to be able to overcome the killing of the young male calves.

The social performance of the companies was increased by various efforts. The high level of staff training shows that companies recognize the positive performance effect but also can be an indicator for shortage of qualified workers, which can also influenced by the rural location of the companies. The talent development and leadership programs give this additional support as they aid to bind promising candidates to the company and support them in their development to generate future leaders on the long term that share company views and culture, which can be utilized to support sustainable management practices (Gloet, 2006). The investment in human capital shows a sustainable human resource strategy that aims to increase future performance (Boudreau & Ramstad, 2005; Closs et al., 2011).

The high engagement in Health and Safety programs is definitely partly forced through the legislation as the work related injury rates in agriculture are among the highest in the industries of New Zealand (Ministry of Business, Innovation & Employment [MBIE],

2016), but the emphasis of health and safety training by the interviewees showed that work-related injuries are a problem that is taken seriously. The prevention of those reduces not only personal medical costs, the cost of rehabilitation and loss of earnings of the individual (Litchfield, 1999), but also increase overall productivity and therefore have positive effect on the economic performance.

The work environment was already linked to the long term sustainability of businesses by Wilkinson, Hill & Gollan (2001) and the analysis of this case study supports it. The approaches to create a better work environment differ in dimension, as the larger enterprises are able to create whole programs around this topic through their financial abilities, while smaller companies are creating it through a family-like culture, for example shared lunch. The work life balance was also seen as a vital step to enhance the performance of the staff, and was already linked to a superior organizational performance as social exchange processes are enriched and turnover reduced. The economic success is also supported through cost savings and a heightened productivity (Beauregard & Henry, 2009). If the reduction of paperwork through the replacement on electronic devices has a positive environmental impact is debatable. On one hand the paper usage is reduced while productivity is increased, but on the other hand the energy needed to charge or run the computers, smartphones or tablets is also increased.

Only one case provided an incentive for sustainable behaviour through an award, while others failed to create stimuli to enhance sustainability among staff. As low salaries in the food supply chain were criticized by Maloni & Brown (2006) this was not applicable to this case study because New Zealand introduced a minimum wage, which prohibits underpayment. This is further supported through providing of housing for farm workers. The companies also showed awareness that low wages have a negative impact on productivity, and increase absenteeism and turnover, which was already scientifically proven (Carter et al., 2007, Holmes, et al. 1996; McElroy et al. 1993).

Overall we can see that social efforts have a positive impact on the economic performance of a company but to link these general efforts with the environmental performance is hard to justify as most of them do not have an environmental side to them.

The Food Safety programs are part of the social responsibility towards consumers, while the critique about the extent for smaller companies can be time intensive and resource binding, especially if additional regular quality checks are also implemented. Nonetheless the

importance to prevent harm to humans is part of sustainable behaviour as it reduces the risk of future reputation loss of the company as well as the New Zealand cheese industry as well as financial cuts through lawsuits that can even lead to bankruptcy, especially as smaller companies have most of the time small reserves for those cases (Akkerman, Farahani, & Grunow, 2010).

The social responsibility towards the society is clearly accepted by all the analysed companies, which is shown through their various long-term engagement and programs. Similar findings were reported by Lawrence, Collins, Pavlovich & Arunachalam (2006), which studied sustainability practices of New Zealand SMEs.

The community support through sponsorships or donations show a direct commitment to the local population and are creating a caring image. Furthermore is has been correlated with a higher job satisfaction among staff, which increases productivity (Smith, 2008) and can also be utilized to advertise the business, which can reduce other advertisement costs. To assess if the spending actually have a positive financial return is a complicated question, as the exact measurement tools for that were not identified in the study. The free milk and breakfast for schools programs are a unique way to alter behaviour towards dairy products in the future, so securing future consumers is a key argument for a positive economic impact. Additionally the engagement is supports children of underprivileged families that cannot or do not provide a nutrient diet. Therefore the reputation and the image of a company are positively influenced, especially in the consumer group of parents, pupils and teachers. The cultural advisory group show awareness of history and the society of New Zealand and reduce the risk of bad reputation through conflicts with local Māori tribes, while only two larger enterprises saw the need to establish such a group. The provisions of university scholarships by two companies show the differences in financial power of this case study, while those can be seen as an extension of the talent development programs.

Overall only two companies could be identified, where the efforts towards society are also interlinked with environmental protection, which again shows that the social engagement is mostly be linked to enhanced economic performance. The influences of these efforts on the economic performance of the companies vary in dimension and scope due to the different sizes of the enterprises. The engagement of all companies in those named practices show again that responsibility for the society is recognised and also taken, even while the economic benefits are hard to quantify, which was also ascertained by Glen (2013). Cost reduction,

increased reputation, image, performance as well as better quality are definitely positive economic outcomes that were linked to the analysed sustainability efforts. Interestingly only two practitioners also see a negative side of the sustainability, which fits the picture of sustainability is mostly seen as a win-win situation, while a positive or negative return on investment in those efforts is not even quantified due to the lack of introduced measurement systems.

5.2. Fit in the Sustainable Supply Chain Management Theory

None of the involved businesses claimed to have a sustainable supply chain, so a direct evaluation of the chains based on the SSCM theory is not applicable. This discussion aims to show the differences of the theory and practice, and provide a reasoning why the reality differentiates from an optimal sustainable supply chain.

Firstly the motivators to become more sustainable of this case study line up with the Delphi sutdy of Seuring & Müller (2008b), where consumers were named the strongest motivator, while NGOs were not even named. The proactive commitment of the engaged companies is also seen by the high number of managers are seen as drivers, which follows Closs et al. study (2011). The confirmation of these finding supports the research in this area, while the work of the NGO should not be seen as unnecessary as they act as whistle-blowers and help to create awareness and solutions to diverse topics and furthermore provide a governance function (Brakman Reiser & Kelly, 2011). While none of the participators named the achievement of a competitive advantage as a primary reason the answers of the anticipated outcomes follows this principle of the resource based view (Barney, 1991; Gold et al., 2009).

Carter & Rogers' (2008) four **facilitators** describe essential requirements of sustainable supply chain management practices. The first facilitator strategy was also identified in this case study, while only three companies overall introduced a written corporate strategy, which includes sustainability goals, all companies demonstrate awareness through their various sustainability efforts. Several initiatives to increase the sustainability of the supply chain align with the first facilitator, for example the use of local chains, the supplier selection and assessment on environmental and social standards, etc., which is not a formalised process in the small enterprises. The SSCM theory anticipates that a strategy is clearly enunciated (Carter & Easton, 2011), which may be the case in large or even medium enterprises, but

smaller companies strategies are often rather influenced by the personal values of the owner (Kotey & Meredith, 1997). The second facilitator risk management in was also found in the analysis. Food safety programs and extra testing of used ingredients reduce the risks of the whole supply chain, and the traceability of the products can also prevent harms towards humans, in case of a lately recognized failures. As already critically viewed Palm Kernel Expeller is only sourced from sustainable verified suppliers, the reputation loss in case of scandals around the palm oil topic is also reduced. The proactive commitment of the companies additionally reduces the risk of conflicts with law and regulations. The small companies with a single local dairy milk supplier have a high risk of losing their main ingredient supplier, in case of natural disasters, which is not a unrealistic scenario as earthquakes are common in New Zealand. The integration of additional milk suppliers that reach the same superior quality standard is problematic for small companies as they do not have a high demand to influence behaviour of their suppliers and also profit from the personal relationship, which replaces constant assessments. While other suppliers are not controllable for small companies as they lack of resources to constantly analyse the behaviour of suppliers, for example if packaging is sourced in China. The third facilitator organizational culture was also found in the analysis, as a strong engagement in sustainability practices by the staff was found in the majority of the cases and even clear sustainability guidelines were introduced. Furthermore the whole supply chain should share a mutual organizational culture to facilitate sustainability efforts (Spekman et al. 1998; Gold et al. 2009), which was applicable for milk suppliers in this case study, because of personal connections between the engaged companies. However a common culture with other suppliers was not detectable in the analysis, which was reasoned by the geographic distance and rather small volumes of sales. Transparency of sustainability efforts and stakeholder engagement is part of the last facilitator transparency. The analysis showed that only two companies did not provide any information about their sustainability efforts on their websites, while not all of the other five companies provided a holistic overview of their practices. The large enterprises can invest more into the green marketing due to superior resources. This was also applicable to the cultural advisory groups, which were only existent in those. The insight about supply chain wide practices was only applicable to companies that integrated the supply chain in their company and partly with suppliers were a personal connection existed. Again the theory anticipated a perfect world, where every company knows where their products are coming from and even has the power to influence them, which is not the case especially as wholesalers are often used in the supply chain and sub-suppliers are unknown.

Certainly the business environment impacts on the cheese supply chain in different efforts. The restriction section of the analysis verifies the that insufficient financial founds, untrained workforce, lack of governmental support as well as the existing infrastructure hinder the feasibility of sustainable supply chain management (Osinga & Hofstede, 2006Smith, 2008; Trienekens, 2011). Furthermore the view that consumers do not request more sustainable behaviour as well as the lack of enforcement and up to date regulations by the government follows the research of Linton et al. (2007) that individual and group behaviours have a negative impact on the sustainability of companies. This finding is curious as companies view two sides of consumers and government that on one hand motivates them to a proactive approach but on the other hand hinders sustainability through their behaviour. The inputs of the cheese supply chain can mostly be seen as near commodity as they are all traded around the world and agricultural products. The recommended strategy of Smith (2008) to create an in-house supply chain with more sustainable practices, which is then transferred to the greater supply chain, was not directly found, but the in-house standard of Orange showed similarities. That close collaboration between supply chain partners lead to high quality products (Smith, 2008; Trienekens, 2011) was confirmed in this case study as mainly smaller cheese manufacturers with personal connections to their milk suppliers or even integrated milk supplying reported a quality gain. The involved cheese manufactures won several prices for their cheese creations. The assumption of Smith (2008) that short supply chains would ease the process for the integration of sustainable practices in the supply chain does not consider the restrictions that small or medium companies face as they lack of influence over their suppliers for already above mentioned reasons.

The analysed governance structures that ensure the environmental and social performance of the supply chain show a rather clear pattern. The larger companies rather follow the supplier management for risks and performance and the smaller companies fall the supply chain management for sustainable products category (Seuring & Müller, 2008a). In the first case the two larger companies have a rather extended supplier evaluation through auditing and formal supplier selection systems and the already mentioned minimum requirements for environmental and social requirements. The certification of milk suppliers was as also implemented by Orange, while overall the certifications of suppliers was not widely adopted, which follows the research of Seuring & Müller (2008a) as well. Incentives were likewise provided through a price premium system, which is depending on the "sustainability level" and followed the reasoning by Perez-Aleman & Sandilands (2008). Vertical integration of

key suppliers following the first supply chain management method (Carter & Rogers, 2008) was partially applicable as one large company is owned by the supplying farmers, which provided various services for their milk supplier to enhance their sustainability. The second case showed several similarities with the findings from the smaller companies that have a focus on sustainable products with a high quality, which fits to the artisan cheese market (Akkerman et al., 2010). The aim to create products with an improved environmental and social quality requires an increased communication with the suppliers (Seuring & Müller, 2008a), which was found among the smaller enterprises that had a rather informal approach to select their suppliers and build a constant relationship with them. Those structures and collaborations, especially in local supply chains, build up trust through a personal connection, and regular meetings between the engaging parties that is able to replace the need for certificates, which favours smaller companies that do not want to invest into accredited certifications of their businesses. The vertical integration of milk production in the smaller cheesemaking businesses can be seen as the ultimate form of collaboration, which allow total quality, environmental and social control of their key ingredient supply (Carter & Rogers, 2008). However the problem with suppliers that are allocated further away remains, which is another problem that the theory did not integrate in the considerations. Overall the differences in the governance structures may also lay in the different markets that companies aim for. Larger enterprises with the aim on the international market have a larger supply chain, which increases environmental and social risks through the larger number of suppliers, and a more formal way through extended evaluation is able to introduce minimum standards that decrease these risks again (Smith, 2008).

As mentioned in the literature review partnerships with government organisations and universities can assists sustainability efforts through knowledge transfer (Mooradian, et al. 2006; Beske et al., 2014). The engagement of the three large companies confirms the mentioned research findings, but the non-engagement of the small companies leaves room for interpretation. The reasons for the not engagement can be manifold, while probably missing resources play a role in that. The recommendation of Pere-Aleman and Sandilands (2008) that especially smaller companies should integrate them in their efforts was not implemented.

Linton et al. (2007) already criticized the complexity of sustainable supply chain practices that are caused by the additional coordination and interaction with the suppliers, which also applies to the findings in this case study as influence on suppliers was not even possible. As most of the efforts were also not measured from the beginning due to a lack of

methods, the anticipated outcomes could repeatedly not based on data but rather a view of the interviewee, which supports the research of Binder et al. (2012). Toman (1994) already saw the problematic relationship between human behaviour and sustainability, which was also applicable in this case study, as participants recognized that consumer behaviours are hindering more sustainable practices. Pagell & Wu's (2009) research about a truly sustainable supply chain also includes that no "net harm to a natural […] system" would be done, which is absolutely not applicable and unrealistic to the cheese supply chain as milk is the primary ingredient and the production already produces greenhouse gases. Furthermore ingredients have to be imported and long distance haulage based renewable energies is not available yet. Many more impacts towards the environment can be found, which make the proposition absolutely unrealistic. The financial investments that sustainability efforts required were also named as the restriction for implementation, which was already stated by Hahn & Scheermesser (2006).

5.3. Conclusion of the Findings

The discussion allows the assumption that the theories around sustainable supply chain management are mainly focused on large enterprises like multinational companies that act on various markets as many formal processes are anticipated. In addition, the business environment of New Zealand is also hindering sustainable behaviour and actions of the cheese supply chain. If artisan cheese companies act more sustainable than their industrial competitors based on the efforts throughout the supply chain, is not ascertainable as the differences need further evaluation.

Overall it's also questionable that the created competitive advantages can be not be recreated by others as the overall complexity of the cheese supply chain can be seen as rather low, however if already introduced processes are forced through new regulations a competitive advantage can be drawn (Carter & Dresner, 2001). In addition the already increased reputation and the created image can support the advantage of other not-proactive companies and supply chains. The stated future plans are all aiming to increase the environmental protection, which allows the interpretation that they do not see a problem with their social performance. However, the awareness of negative environmental impacts through their business is recognized and concrete plans also reinforce their proactive engagement for sustainability.

5.4. Implications

In the following implications from the findings and the discussion are presented.

5.4.1. Implications for Theory

The social efforts are often already forced through legislation. The custody of the state in the New Zealand is already pushing companies into social responsibility and sustainability, which probably the case in most developed countries. Overall the sustainability debate has the biggest impact on multinational companies that operate in developing countries with less legal obligations as they need to provide systems and programs that intercept the missing laws and regulations. In addition the proposition that sustainability can only be reached by efforts that impact all three areas of Elkington's (1997) triple bottom line and other efforts that only affect two areas are labelled as 'better' (Carter & Easton, 2011) are narrow minded. Those social or environmental efforts still can still have a positive impact on the economic performance and the sustainability, while they cannot be linked to each other. A rating of those can only be made in a direct comparison of the actual intensity of the impact. Therefore, the model should be changed to a more concrete impact connected one.

In addition, the theories of sustainable supply chain management did partly not fit to smaller companies and their circumstances. A review of the current models and the particularly SME circumstances could lead to a remodelling or even new models for SME supply chain sustainability. However, the implementation of sustainable supply chain management practices supports the current

5.4.2. Implications for Practice

If businesses want to enhance the sustainability of the supply chain incentives such as price premiums, long term contracts and assistance have to be provided to encourage suppliers that fear uncertainty, investment costs and changes of current costs (Perez-Aleman & Sandilands, 2008). Measurement system to control, monitor and evaluate the undertaken efforts on the impact on social, environmental and economic performance should be implemented in the companies. Thereby the projects or programs can be utilized for own sustainability reports and marketing campaigns. The publishing of those sustainability efforts

help the companies to increase their reputation, attract sustainable conscious customers and create a competitive advantage. This also is a recommendation that focuses on small companies that lack of publically available information about their own sustainability efforts.

SMEs should work together with experts, NGOs, industry associations and governmental organisations in the development or improvement of their efforts as the knowledge transfer reduces the affiliated costs, resources and time (Perez-Aleman & Sandilands, 2008). Furthermore, the collaboration of smaller cheesemakers could create several advantages for them, for example increased influence over suppliers and reduced costs through bulk buying.

The rural companies should also utilize their associations to lobby for the creation of rural infrastructure system that enhance their and the community sustainability, for example recycling services and the extensions of power supply system. The New Zealand government should follow the advices of the UN Climate conference and take responsibility for their infrastructure improvements and provide support and incentives for sustainability to utilize it as an innovation driver to maintain the positive green image of its country.

Smaller cheesemakers should select milk suppliers carefully to enhance the overall sustainability of their supply chain as they create the largest environmental impact. The supply management practices for sustainable products (Seuring & Müller, 2008a) can provide a framework for supplier governance without using cost intensive certifications or regular audits by third parties.

The case study provided several examples were technologies was used as a facilitator for sustainability efforts, therefore managers inform themselves about modern possibilities through applicable software to facilitate their efforts through technology.

The anticipated law and regulation changes by the industry experts also lead to the conclusion that pro-activeness towards sustainability reduces future costs and is also able to create a competitive advantage over other trade rivals.

5.5. Limitations

The nature of multi-case studies limits the generalizability of the findings (Voss et al., 2002; Yin, 2003) and the drawn conclusions and implications cannot be further adopted without a case to case consideration. The data collection was focused on pro-active

companies to maximise the cumulated data about sustainability efforts, while they probably do not represent the average of the industry.

The bias by respondents has to be acknowledged as well. As only one interview per case was conducted due to time and research budget restraints the respondents were not always experts or practitioners in supply chain management. In addition the social desirability of the answers around sustainability has to be considered because a negative statement about the business could also damage the reputation and endanger the work contract or future career. Therefore, a tendency towards rather positive statements can distort the data.

The case study is not able to provide a complete and detailed overview and is rather superficial in the environmental, social and economic details due to the comparison of the involved companies that vary in size, financial power, and scope. This was inevitable as the aim of the case selection was to represent typical exemplars of the supply chain. However, six of seven companies were located on the South Island of New Zealand, which also biased the data through the local circumstances.

5.6. Future Research Opportunities

As sustainability is a rather a concept the comparison between companies is fairly difficult. The development of a measurement scheme for sustainability in the dairy industry that is based on different criteria would not only add value to the academic world but would also allow consumers to compare between companies, which could alter their current behaviour. Overall the dairy industry of New Zealand shows great potential as it is a major part for the country's economy. A case study with a more comparable sample, for example only artisan cheesemakers, would allow to compare sustainability in more specific aspects and can reveal undiscovered features that help to implement sustainability efforts in the specific companies. Further research about artisan cheese and sustainability could also be utilized and add marketing potential for the New Zealand tourism industry and attract foreigners and local consumers through sustainable, high quality cheese (Hall et al. 2004). This would be an interesting future research opportunity that supports small artisan cheese manufacturers as well and provide an opportunity for sustainable tourism in New Zealand (Sims, 2009).

6. Conclusion

The undertaken efforts throughout the cheese supply chain vary significantly in this explorative case study through their different scopes, but the various practices support and affirm already established research findings. A wide adoption of basic environmental protecting and social practices was discovered, while the implementation of advanced practices varies depending on the scope and the size of the company. The environmental efforts are often linked to reduced costs and a positive reputation and create an environmental conscious image for the companies. Social efforts within in the company are mostly related to increased performance of employees, while the efforts towards the society mainly increase the image of the involved company.

The case study shows that certain practices are already implemented in New Zealand cheese supply chain, which

The research provided insights that may increase the awareness of sustainability issues of the cheese supply chain and motivate for further actions that allow the cheese supply chain to minimize their negative impacts towards the environment and improve the circumstances for their staff and the society. The theory of sustainable supply chain management takes propositions and positions that are unworldly and based on perfect circumstances. Therefore a change has to be made in this research field, and practitioners have to be integrated in the research to start developing theories that can actually be applied to praxis. The current theory can be seen as an ideal, which can never be reached or at least not with current technology levels. It should rather be seen as a template, which has to be modified to fit into the real world. The problem to measure the impact of the efforts, gives the academic wold the opportunity to increase the research of practical measurement system around sustainability efforts but practitioners should also increase their engagement in the evaluation of their practices as well as the promotion of them to increase awareness and utilize the marketing potential. A more strategic approach towards sustainability will not only have a positive economic impact but can also create a competitive advantage that allows companies to sustain their business on the long term. Further research in the field of sustainability and the cheese industry is needed to support businesses and organizations and allow future generations to enjoy cheese while living on this earth.

7. References

7.1. Books

Castka, P. and Corbett, C.J. (2015). *Management Systems Standards: Diffusion, Impact and Governance of ISO 9000, ISO 14000 and other management systems; Foundations and Trends in Technology, Information and Operations Management.* NOW Publishers; research monograph; by invitation; Vol 7 Nos3/4, 222 pages.

Cavana, R., Delahaye, B. L., & Sekeran, U. (2001*). Applied business research: Qualitative and quantitative methods.* John Wiley & Sons Australia.

Christopher, M. (2005). *Logistics and supply chain management: creating value-added networks.* Pearson education.

Corti, L., & Thompson, P. (2006). S*econdary analysis of archived data. Qualitative Research Practice:* Concise Paperback Edition, SAGE Publications Ltd, London, 297-313.

de Bruin, A., & Lewis, K. (2005). *Green entrepreneurship in New Zealand: A micro-enterprise focus. Making ecopreneurs: Developing sustainable entrepreneurship,* 61-71. M. T. Schaper (Ed.). Gower Publishing, Ltd

Elkington, J. (1997). *Cannibals with Forks: The Triple Bottom Line of the 21st Century.* New Society, Stoney Creek, CT.

Hammersley, M. (1992). *What's Wrong with Ethnography? Methodological exploration.* Routledge, London.

Hall, C. M., Sharples, L., Mitchell, R., Macionis, N., & Cambourne, B. (Eds.). (2004). *Food tourism around the world.* Routledge.

Lambert, D.M., Croxton, K.L., Garcı´a-Dastugue, S.J., Knemeyer, M. and Rogers, D.S. (2006). *Supply Chain Management Processes, Partnerships, Performance* (2nd ed.). Hartley Press Inc., Jacksonville, FL.

Liamputtong, P. (2013). *Qualitative research method* (4th ed.). Melbourne, Australia: Oxford University Press.

Miles, M., & Huberman, M. (1994). Q*ualitative Data Analysis: An expanded Sourcebook.* Thousands Oaks, CA: Sage Publications

Myers, M. D. (2009). *Qualitative Research in Business & Management.* London, United Kingdom: Sage Publications.

Osinga, S. A., & Hofstede, G. J. (2006). *Transparency in the pork supply chain: comparing China and the Netherlands. Trust and Risk in Business Networks.* University of Bonn–ILB-Press, Bonn, 93-104.

Savitz, A.W. and Weber, K. (2006). *The Triple Bottom Line.* Jossey-Bass, San Francisco, CA.

Smith, B. G. (2008). *Developing sustainable food supply chains.* Philosophical Transactions of the Royal Society B: Biological Sciences, 363(1492), 849-861.

World Commission on Environment and Development (1987). *Our Common Future,* OxfordUniversity Press, New York, NY.

Yin, R. (1994). *Case Study Research. Design and Methods* (2nd ed.). London, United Kingdom: Sage.

Yin, R. (2003). *Case Study Research: Design and Methods* (3rd ed.). London, United Kingdom: Sage.

7.2. Journal Articles

Akkerman, R., Farahani, P., & Grunow, M. (2010). Quality, Safety and Sustainability in Food Distribution: A Review of Quantitative Operations Management Approaches and Challenges. *Or Spectrum, 32*(4), 863-904.

Ayuso S. 2006. Adoption of Voluntary Environmental Tools for Sustainable Tourism: Analysing the Experience of Spanish Hotels. *Corporate Social Responsibility and Environmental Managemen,t 13*(4), 207–220.

Bansal, P. (2005). Evolving sustainably: a longitudinal study of corporate sustainable development. *Strategic Management Journal, 26*(3), 197-218.

Bardasi, E., & Francesconi, M. (2004). The Impact of atypical employment on individual wellbeing: evidence from a panel of British workers. *Social science & medicine, 58*(9), 1671-1688.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management, 17*(1), 99-120.

Beske, P., Land, A., & Seuring, S. (2014). Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature. International *Journal of Production Economics, 152*, 131-143.

Beauregard, T. A., & Henry, L. C. (2009). Making the link between work-life balance practices and organizational performance. *Human resource management review, 19*(1), 9-22.

Boudreau, J. W., & Ramstad, P. M. (2005). Talentship, talent segmentation, and sustainability: A new HR decision science paradigm for a new strategy definition. *Human Resource Management, 44*(2), 129-136.

Binder, C. R., Schmid, A., & Steinberger, J. K. (2012). Sustainability solution space of the Swiss milk value added chain. *Ecological Economics, 83*, 210-220.

Brakman Reiser, D., & Kelly, C. (2011). Linking NGO accountability and the legitimacy of global governance. *Brooklyn Journal of International Law, 36*, 1011-1073.

Brown, K.A. (1996). Workplace safety: a call for research. J*ournal of Operations Management, 14* (2), 157-61.

Burke, L., & Logsdon, J. M. (1996). How corporate social responsibility pays off. *Long range planning, 29*(4), 495-502.

Capaldi, N. (2005). Corporate social responsibility and the bottom line. *International Journal of Social Economics, 32*(5), 408-23.

Carter, C.R. & Dresner, M. (2001). Environmental purchasing and supply management: cross-functional development of grounded theory. *Journal of Supply Chain Management, 37*(3), 12-27.

Carter, C. R., & Easton, P. L. (2011). Sustainable supply chain management: evolution and future directions. *International Journal of Physical Distribution & Logistics Management, 41*(1), 46-62.

Carter, C.R. , Ellram, L.M. & Tate, W.L. (2007). Structure and influence: a logistics management application of social network analysis. *Journal of Business Logistics, 28*(1), 137-68.

Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: moving toward new theory. *International journal of physical distribution & logistics management, 38*(5), 360-387.

Childerhouse, P., Aitken, J., & Towill, D. R. (2002). Analysis and design of focused demand chains. *Journal of Operations Management, 20*(6), 675-689.

Closs, D. J., Speier, C., & Meacham, N. (2011). Sustainability to support end-to-end value chains: the role of supply chain management. *Journal of the Academy of Marketing Science, 39*(1), 101-116.

Collins, E., Roper, J., & Lawrence, S. (2010). Sustainability practices: trends in New Zealand businesses. *Business Strategy and the Environment, 19*(8), 479-494.

Lawrence, S. R., Collins, E., Pavlovich, K., & Arunachalam, M. (2006). Sustainability practices of SMEs: the case of NZ. *Business strategy and the environment, 15*(4), 242-257.

Drumwright, M. E. (1994). Socially responsible organizational buying: environmental concern as a noneconomic buying criterion. *The Journal of Marketing*, 1-19.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review*, *14*(4), 532-550.

Ellen, P.S., Webb, D.J. and Mohr, L.A. (2006). Building corporate associations: consumer attributions for corporate social responsibility programs. *Journal of the Academy of Marketing Science, 34* (2), 147-57.

Faye, B., & Konuspayeva, G. (2012). The sustainability challenge to the dairy sector–The growing importance of non-cattle milk production worldwide. *International dairy journal*, *24*(2), 50-56.

Folkerts, H., & Koehorst, H. (1997). Challenges in international food supply chains: vertical co-ordination in the European agribusiness and food industries. *Supply Chain Management: An International Journal*, *2*(1), 11-14.

Gerosa, S., Skoet, T., Muehlhoff, E., Bennett, A., & McMahon, D. (2013). Milk availability: current production and demand and medium-term outlook. *Milk and dairy products in human nutrition*, 11-40.

Gloet, M. (2006). Knowledge management and the links to HRM: Developing leadership and management capabilities to support sustainability. *Management Research News*, *29*(7), 402-413.

Gold, S., Seuring, S., & Beske, P. (2010). Sustainable supply chain management and inter-organizational resources: a literature review. *Corporate social responsibility and environmental management*, *17*(4), 230-245.

Gupta, S., Palsule-Desai, O. D. (2011). Sustainable supply chain management: Review and research opportunities. *Management Review*, *23*, 235-245.

Hahn, T., Figge, F., Pinkse, J., & Preuss, L. (2010). Trade-offs in corporate sustainability: you can't have your cake and eat it. *Business Strategy and the Environment*, *19*(4), 217-229.

Hahn T, Scheermesser M. (2006). Approaches to Corporate Sustainability among German Companies. *Corporate Social Responsibility and Environmental Management 13*(3), 150–165.

Hanson, J.D., Melnyk, S.A. and Calantone, R.J. (2004). Core values and environmental Management. *Greener Management International, 46*, 29-40.

McDonald, S., & Oates, C. J. (2006). Sustainability: Consumer perceptions and marketing strategies. *Business Strategy and the Environment*, *15*(3), 157-170.

Higgins, V., Dibden, J., & Cocklin, C. (2008). Building alternative agri-food networks: Certification, embeddedness and agri-environmental governance. *Journal of Rural Studies, 24*(1), 15-27.

Hofstede, J.G., Fritz, M., Canavari, M., Oosterkamp, E., & van Sprundel, G. J. (2010). Towards a cross-cultural typology of trust in B2B food trade. *British Food Journal, 112*(7), 671-687.

Holmes, S.M., Power, M.L. and Walter, C.K. (1996). A motor carrier wellness program: development and testing. *Transportation Journal, 35*(3), 33-48.

Ilbery, B., & Maye, D. (2005). Food supply chains and sustainability: evidence from specialist food producers in the Scottish/English borders. *Land Use Policy, 22*(4), 331-344

Jeurissen, R. (2000). John Elkington, Cannibals with forks: The triple bottom line of 21st century business. *Journal of Business Ethics, 23*(2), 229-231.

Kaptein, M., & Wempe, J. (2001). Sustainability Management. *Journal of Corporate Citizenship, 2001*(2), 91-106.

Korpela, J., Lehmusvaara, A., & Tuominen, M. (2001). Customer service based design of the supply chain. *International Journal of Production Economics, 69*(2), 193-204.

Kotey, B., & Meredith, G. G. (1997). Relationships among owner/manager personal values, business strategies, and enterprise performance. *Journal of small business management, 35*(2), 37.

Litchfield, M. H. (1999). Agricultural work related injury and ill-health and the economic cost. *Environmental Science and Pollution Research, 6*(3), 175-182.

Linton, J. D., Klassen, R., & Jayaraman, V. (2007). Sustainable supply chains: An introduction. *Journal of Operations Management, 25*(6), 1075-1082.

Maloni, M. J., & Brown, M. E. (2006). Corporate social responsibility in the supply chain: an application in the food industry. *Journal of business ethics, 68*(1), 35-52.

Margolis, J. D., & Walsh, J. P. (2003). Misery loves companies: Rethinking social initiatives by business. *Administrative science quarterly, 48*(2), 268-305.

Martin, P. L. (1991). Hearings of the commission on agricultural workers. *Labor Management Decisions, 1*(1), 6-7.

McElroy, J.C., Rodriguez, J.M., Griffin, G.C., Morrow, P.C. and Wilson, M.G. (1993). Career stage,time spent on the road, and truckload driver attitudes. *Transportation Journal, 33*(1), 5-14.

Montabon, F., Melnyk, S.A., Sroufe, R. and Calantone, R.J. (2000). ISO 14000: assessing ist perceived impact on corporate performance. *Journal of Supply Chain Management, 36*(2), 4-16.

Mooradian, T., Renzl, B., & Matzler, K. (2006). Who trusts? Personality, trust and knowledge sharing. *Management learning, 37*(4), 523-540.

Murphy, P. R., Poist, R. F., & Braunschwieg, C. D. (1994). Management of environmental issues in logistics: Current status and future potential. *Transportation journal*, 48-56.

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization studies, 24*(3), 403-441.

Pagell, M., & Wu, Z. (2009). Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars. *Journal of supply chain management, 45*(2), 37-56.

Pagell, M., Wu, Z., & Wasserman, M. E. (2010). Thinking differently about purchasing portfolios: an assessment of sustainable sourcing. *Journal of Supply Chain Management, 46*(1), 57-73.

Paracchini, M. L., Pacini, C., Jones, M. L. M., & Perez-Soba, M. (2011). An aggregation framework to link indicators associated with multifunctional land use to the stakeholder evaluation of policy options. *Ecological Indicators, 11*(1), 71-80.

Perez-Aleman, P., & Sandilands, M. (2008). Building value at the top and bottom of the global supply chain: MNC-NGO partnerships and sustainability. *California management review, 51*(1), 24-49.

Perry, C. (1998). Processes of a case study methodology for postgraduate research in marketing. *European journal of marketing, 32*(9/10), 785-802.

Porter, M., & van der Linde, C. (1995). Green and competitive: ending the stalemate. *Harvard Business Review*, *73*(5), 120-134.

Pullman, M. E., Maloni, M. J., & Carter, C. R. (2009). Food for thought: social versus environmental sustainability practices and performance outcomes. *Journal of Supply Chain Management, 45*(4), 38-54.

Rossing, W. A. H., Zander, P., Josien, E., Groot, J. C. J., Meyer, B. C., & Knierim, A. (2007). Integrative modelling approaches for analysis of impact of multifunctional agriculture: a review for France, Germany and The Netherlands. *Agriculture, ecosystems & environment, 120*(1), 41-57.

Rivera-Camino, J. (2007). Re-evaluating green marketing strategy: a stakeholder perspective. *European Journal of Marketing, 41*, 1328-58.

Seuring, S. (2011). Supply chain management for sustainable products–insights from research applying mixed methodologies. *Business Strategy and the Environment, 20*(7), 471-484.

Seuring, S., & Müller, M. (2008a). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of cleaner production, 16*(15), 1699-1710.

Seuring, S., & Müller, M. (2008b). Core issues in sustainable supply chain management–a Delphi study. *Business strategy and the environment, 17*(8), 455-466.

Sharma, S., & Henriques, I. (2005). Stakeholder influences on sustainability practices in the Canadian forest products industry. *Strategic Management Journal, 26*(2), 159-180.

Siems, T. (2005). Who supplied my cheese? Supply chain management in the global economy. *Business Economics, 40*(4), 6-21.

Sim, S., Barry, M., Clift, R., & Cowell, S. J. (2007). The relative importance of transport in determining an appropriate sustainability strategy for food sourcing. *The International Journal of Life Cycle Assessment, 12*(6), 422-431.

Sims, R. (2009). Food, place and authenticity: local food and the sustainable tourism experience. *Journal of Sustainable Tourism, 17*(3), 321-336.

Spekman RE, Kamauff JW Jr., Myhr N. (1998). An empirical investigation into supply chain management: A perspective on partnerships. International Journal of Physical Distribution & *Logistics Management, 28*(8), 630–650.

Srivastava, S. K. (2007). Green supply-chain management: a state-of-the-art literature review. *International journal of management reviews, 9*(1), 53-80.

Subramanian, R., Talbot, B., & Gupta, S. (2010). An approach to integrating environmental considerations within managerial decision-making. *Journal of Industrial Ecology, 14*(3), 378-398.

Toman, M. A. (1994). Economics and" sustainability": balancing trade-offs and imperatives. *Land economics*, 399-413.

Trienekens, J. H. (2011). Agricultural value chains in developing countries a framework for analysis. *International Food and Agribusiness Management Review, 14*(2).

Vachon S., Klassen R.D. (2006). Extending green practices across the supply chain. The impact of upstream and downstream integration. *International Journal of Operations & Production Management 26*(7), 795–821.

Van Middelaar, C. E., Berentsen, P. B. M., Dolman, M. A., & De Boer, I. J. M. (2011). Eco-efficiency in the production chain of Dutch semi-hard cheese. *Livestock Science, 139*(1), 91-99.

Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case research in operations management. *International journal of operations & production management, 22*(2), 195-219.

Vurro, C., Russo, A., & Perrini, F. (2009). Shaping sustainable value chains: Network determinants of supply chain governance models. *Journal of business ethics, 90*(4), 607-621.

Wilkinson, A., Hill, M., & Gollan, P. (2001). The sustainability debate. *International Journal of Operations & Production Management, 21*(12), 1492-1502.

Wognum, P. N., Bremmers, H., Trienekens, J. H., van der Vorst, J. G., & Bloemhof, J. M. (2011). Systems for sustainability and transparency of food supply chains–Current status and challenges. *Advanced Engineering Informatics, 25*(1), 65-76.

7.3. Other Resources

Aguirre-Villegas, H., Kratz S., Milani, F., Newenhouse, A., Passos-Fonseca, T., Reinemann, T. (2011). *Sustainable Cheese Production: Understand the Carbon Footprint of Cheese. University of Wisconsin-Madison College of Agricultural and Life Sciences.* Retrieved from http://clean-water.uwex.edu/pubs/pdf/CF-Cheese.pdf.

AHDB (2015). *World Milk Production.* Retrieved from http://dairy.ahdb.org.uk/market-information/supply-production/milk-production/world-milk-production/#.Vm-AgEYbTxN.

BUSINESS.GOVT.NZ. (2015). *Sustainability.* Retrieved from http://www.business.govt.nz/laws-and-regulations/the-environment/sustainability.

Clark, H. (2006). *Adress to NZ Labour Party.* Annual Conference. Rotorua.

Coker, C., Honore, C., Johnston, K., & Creamer, L. (1997). *Manufacture and use of cheese products.* Retrieved from https://www.google.co.nz/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjV-ZGH2qjJAhUmH6YKHX4iAwoQFggcMAA&url=http%3A%2F%2Fnzic.org.nz%2FChemProcesses%2Fdairy%2F3D.pdf&usg=AFQjCNESCmdKsSkvjvEr3SMLvXSK-Y8qmw.

DairyNZ (2014). *Quickstats about dairying.* Retrieved from http://www.dairynz.co.nz/media/1357994/quickstats-new-zealand.pdf.

DCANZ (2015). *Dairying Today.* Retrieved from http://www.dcanz.com/about-nz-dairy-industry/dairying-today.

DCANZ (2015b). *New Zealand Milk Production.* Retrieved from http://www.dcanz.com/files/New%20Zealand%20Milk%20Production%2023Nov2015.pdf.

Department of Conservation. (2015a). *The Outlook for Someday.* Retrieved from http://www.doc.govt.nz/get-involved/training-and-teaching/conservation-programmes/the-outlook-for-someday/.

Department of Conservation. (2015b). *Annual Report 2015.* Retrieved from http://www.doc.govt.nz/Documents/about-doc/role/publications/doc-annual-report-2015.pdf

Department of the Prime Minister and Cabinet (DPMC) (2003). *Sustainable Development for New Zealand: Programe of Action.* DPMC, Wellington.

Foster, C., Green, K., & Bleda, M. (2007). *Environmental impacts of food production and consumption: final report to the Department for Environment Food and Rural Affairs.*

Godairy (2015). *Facts and Figures.* Retrieved from http://www.godairy.co.nz/the-big-picture/facts-and-figures.

Gösta, B. (1995). *Dairy processing handbook.* Tetra Pak Processing Systems, A/BLund.

Hall, C. (2016b, March 3). *Farmers feedback will improve calf treatment.* The New Zealand Herald. Retrieved from http://www.nzherald.co.nz/manawatu-guardian/rural/news/article.cfm?c_id=1504000&objectid=11599512.

Indexmundi (2015). *New Zealand Dairy.* Retrieved from http://www.indexmundi.com/agriculture/?country=nz&commodity=cheese&graph=production.

Kalfagianni, A. (2006). *Transparency in the food chain: policies and politics.* CSTM.

Lieffering, M., Ledgard, S.F., Boyes, M. and Kemp, R. (2012). *A Greenhouse Gas Footprint Study for Exported New Zealand Beef.* Retrieved from http://beeflambnz.com/Documents/Farm/A%20greenhouse%20gas%20footprint%20study%20for%20exported%20New%20Zealand%20beef.pdf."

Merrian-Webster (2016). *Full Definiton of Commodity.* Retrieved from http://www.merriam-webster.com/dictionary/commodity.

Ministry for the Environment. (2015). *Sustainability issues facing New Zealand.* Retrieved from http://www.mfe.govt.nz/publications/about-us/2-sustainability-issues-facing-new-zealand.

Ministry of Business, Innovation & Employment. (2011). *SMEs in New Zealand: Structure and Dynamics 2011.* Retrieved from http://www.mbie.govt.nz/info-services/business/business-growth-and-internationalisation/documents-image-library/Structure-and-Dynamics-2011.pdf.

Ministry of Business, Innovation & Employment. (2014). *iFAB 2013 Dairy Review.* Retrieved from http://www.mbie.govt.nz/info-services/sectors-industries/food-beverage/documents-image-library/Dairy%20sector%20review%202013%20-PDF%201.8%20MB.pdf.

Ministry of Business, Innovation & Employment. (2016). *Workplace Health and Safety Strategy.* Retrieved from http://www.dol.govt.nz/whss/statistics.asp.

New Zealand Herald (2016, Februray 20). *Farmers may be charged over animals in waterways.* The New Zealand Herald. Retrieved from http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11592953&ref=NZH_Fbpage.

NZ Wine. (2015). *Sustainability.* Retrieved from http://www.nzwine.com/sustainability/.

Pearce, K. N. (n.d.). *Milk Powder.* New Zealand Institute of Chemistry. Retrieved from http://nzic.org.nz/ChemProcesses/dairy/3C.pdf.

Ruiz, R., Díez-Unquera, B., Beltrán de Heredia, I., Arranz, J., Mandaluniz, N., & Ugarte, E. (2010). *Is cheese making and marketing by farmers determining sustainability in dairy sheep.* FAO-CIHEAM Network on Sheep and Goats: Economic, social and environmental sustainability in sheep and goat production systems. CIHAEM-FAO, Zaragoza, 197-206.

Statistics NZ. (2015a). *Global New Zealand - International trade, investment and travel profile: Year ended June 2015.* Wellington: Ministry of Foreign Affairs and Trade, and Statistics New Zealand.

Statistics NZ. (2015b). *Agricultural Production Statistics: June 2014(final).* Wellington: Ministry of Foreign Affairs and Trade, and Statistics New Zealand.

Statistics NZ. (2015c). *Dairy Industry ´mooooving´ forward.* Retrieved from http://www.stats.govt.nz/browse_for_stats/snapshots-of-nz/yearbook/environment/agriculture/dairy.aspx.

TVNZ (2002). *Report into Dirty Dairying.* Retrieved from http://tvnz.co.nz/content/111164/423466/article.html-.

United Nations (2015). *Trend in Private Sector Climate Finance.* Retrieved from http://www.un.org/climatechange/wp-content/uploads/2015/10/SG-TRENDS-PRIVATE-SECTOR-CLIMATE-FINANCE-AW-HI-RES-WEB1.pdf.

Yakovieva, N. (2009). *Sustainable benchmarking of food supply chains.* George Perkins Marsh Institute Working Paper, 2, 2009.

8. Appendix

Interview Questions Guideline

1. **General Questions**

   Could you give me a small company overview?

   How many people do you employ?

   What kind of products do you produce?

   Are your products exporting to overseas?

   Where do you see your market?

   Are you a member of any associations?

   What would you consider the most important issues, problems or challengs for sustainability in the cheese supply chain?

   What certificates do you hold?

2. **Company related questions**

Environmental Performance

What are you doing to be more environmental friendly and protect the environment?

What kind of problems came along with these efforts and how did you solve them?

What do you plan to improve in the future?

Social Performance

What are you doing to improve the well-being of your staff?

What kind of problems came along with these efforts and how did you solve them?

What are you doing to support the society?

What kind of problems came along with these efforts and how did you solve them?

What do you plan to improve in the future?

Economic Performance

What were the outcomes of your efforts?

How did you quantify those benefits?

3. **Supply Chain**

Where do you source ypur supplies from?

What social and environmental standards do you request from your suppliers?

What is required from you?

How do you asses your suppliers and what are associated problems?

Do you see economic benefits from …?

What were the outcomes of your efforts? Cost reduction? Better image and reputation? Improved performance?

4. Miscellaneous

Who is the motivator behind sustainability efforts?

Are you a member of any associations?

What do you think about current legislation that covers sustainability?